# THE IRON TRADE REVIEW

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## HEAVY SHIPMENTS

### INDICATE A GREAT YEAR IN ORE MOVEMENT.

**Continued Heavy Buying by Agricultural Implement Interests.—'Frisco and Pittsburg Strikes Ended.—Pig Iron Quiet.**

That it will be easy for lake vessels to make a new record in ore shipments this year is clearly shown by the movement for May, which amounted to 5,600,000 tons, within 200,000 tons of July of last year, which was the record month of the lakes, and it will not be difficult for vessels to handle 40,000,000 tons during the season. The car shortage is, however, already being complained of and the railroads will be severely strained to handle the ore received at lower lake ports.

**Buying of Steel Bars**

Buying of agricultural implement manufacturers is still the most active factor in the market. Contracts for heavy tonnages have been placed within a few days. A large majority of western manufacturers are now under contract. At the close of the season of July 1, 1906-07, steel bar contracts will have been completed to an unusual extent, and in some instances more than the tonnages contracted for have been consumed. Specifications are extremely heavy.

**Light Buying of Rails**

The demand for rails is not very active, the heaviest order reported being the Chicago & Northwestern for 40,000 tons for 1908 delivery. It is not expected that buying will be active until after the meeting of representatives of railroads and rail mills, at which an agreement concerning specifications for rails will probably be reached. It is becoming evident that orders for cast iron pipe will be decreased somewhat on account of high prices prevailing, one large producer estimating the probable decrease at from 25 to 30 per cent. While some orders of good size for bridges have been taken, including one for 4,500 tons for a bridge across the Mississippi at Clinton, Ia., the week has not been productive of many large orders. Last month the contracts of the principal producer amounted to 400,000 tons, about one-fifth of the total amount contracted for.

**Pig Iron Is Quiet**

The pig iron market continues quiet, but firm. A large selling concern reports that fully 90 per cent of its customers in New England will require no more iron until the fourth quarter, and that about 65 per cent are covered through the year. Another company reports similar conditions as to its customers in northern New York. In New York City considerable iron will be needed before the close of the year. To meet the expected demand, the amount of unsold iron in this country is not large, and prices are well maintained in England, where stocks are being steadily reduced. The United States Steel Corporation has purchased 10,000 tons of low phosphorus pig iron for delivery during the fourth quarter with a small tonnage in September. This will go chiefly to Pittsburg, but small lots are for delivery at Worcester, Johnstown, Cleveland, and Ambridge.

**Wage Controversies**

The threat of blast furnace workers of the valleys to demand a decrease in hours and an increase in wages, which would cause an advance of 62 per cent of labor costs, is not causing uneasiness among furnace owners, as the leader of the movement has been discredited by the largest labor organization of the country. The strike of machinists at San Francisco has been settled without increase in wages and with the understanding that shorter hours are to be granted in three years. The firm stand of employers at Pittsburg has broken the strike in that city, and Cleveland employers are determined to resist the demands of their machinists, who are now idle.

**Coke Is Still Weak**

The coke market shows little improvement, as production continues to be in excess of demand. The old material market is in a rather better condition than usual at this time of the year, but transactions among dealers form a considerable part of the business being done.

### PITTSBURG STRIKE BROKEN.

(Special Telegram.)

Pittsburg, June 5.—The machinery strike in the Pittsburg district is broken. This strike affected 17 plants in the district, and with the exception of one or two of the smaller machine shops, all manufacturers stood together as a unit and combated the demands of the union for a minimum wage of 40 cents per hour and a shorter work day. The positions of at least two-thirds of the striking machinists have been filled and new men are being brought in by the Manufacturers' Association daily. Many of the old men, when they saw the tide had turned, deserted the union and returned to their old positions.

### BRITISH IRON PRICES.

(Special Telegram.)

New York, June 5.—Number 3 Middlesbrough was down to 60 shillings yesterday, but opened today at 61.

A Japanese railway is inquiring for 500 tons of rails.

**More Coke Ovens.**—The Jamison Coke Co., of Pittsburg, has just finished a tipple and washer at its No. 4 plant at Bradtree, Pa., and is beginning a new steel tipple and steel and concrete washery at its No. 1 plant. This company will build 100 new ovens before fall.

# THE WEEK IN IRON CENTERS.

## PITTSBURG.

**Active Buying of Steel Bars.—Small Sales of Pig.—Rails Quiet.**

Office of THE IRON TRADE REVIEW,
521 Park Bldg., June 5.

The only really active feature in the whole market during the past week has been the heavy sales of steel bars, largely to the agricultural implement interests, and it is conservatively estimated that these interests have now placed about one-third of their requirements of the year beginning July 1. In other finished lines conditions are almost stagnant as far as new business is concerned. This is due entirely to the filled up condition of the mills and inability to assume further obligations for deliveries within any reasonably short time. The leading interest announces that it can take on no further new plate and axle business through the remainder of the year and the steel bar business being taken on has either been discounted for the special trade to which it is going or extends through the first half of next year. As far as local rail manufacturers are concerned, they have not been active at any time since the books for 1908 delivery were opened. Very little is expected until after the joint conference between representatives of the railroads and the rail makers during the next month or six weeks. At this conference an effort will be made to determine what the new railroad rail specifications, particularly as to shape and quality, are to be for the next year. The railroads are about the only interests now in the market for structural material and during the past two weeks have closed for a fair tonnage of bridge work. Aside from this, new building business is very quiet.

**Pig Iron.**—The only sale reported during the week under review was 2,000 tons of Bessemer pig iron for June delivery at $23.50 valley furnaces. There has been but little inquiry during this period as far as steel making iron is concerned, this being largely due to the known sold up condition of merchant furnaces. There has been but little inclination to inquire as to prices for the first quarter of next year, as the feeling prevails that they will be no higher than at the present time and there will be plenty of opportunity to cover at a time nearer the period when the iron is actually needed. No. 2 Northern foundry for prompt delivery is quoted $26 valley and for last half $23 to $23.50. Prompt Bessemer is quoted $25 and last half $23.50 to $24 valley. Southern No. 2 for first quarter of next year is quoted $18 to $18.50 Birmingham. The monthly average price of Bessemer iron for May estimated upon the sale of 35,000 tons during the month was $23.28. The demands of furnace workers in the valleys for a reduction in hours from 12 to eight and an advance from $2.90 for 12-hour day to $3 for an eight-hour day for keepers, and an advance from $2.30 to $2.50, and the same hours for helpers and fillers and an advance of ten cents per day and three hours less labor for laborers, or an estimated total advance in cost of production 62½ per cent, is not taken seriously inasmuch as the demands were made only by one faction of the organization controlling the blast furnace workers. On last half deliveries we quote as follows:

| | |
|---|---|
| Bessemer, Valley | $23.50 to 24.00 |
| Bessemer, Pittsburg | 24.40 to 24.90 |
| No. 1 Foundry, Pittsburg | 23.90 to 24.40 |
| No. 2 Foundry, Pittsburg | 23.90 to 24.40 |
| Gray Forge, Pittsburg | 22.90 to 23.40 |
| Basic, Valley | 23.50 to 24.00 |
| Basic, Pittsburg | 24.40 to 24.90 |

**Ferro-Manganese.** — Betterment in the supply of manganese is noted during the past week and there are indications that consumers, except in odd instances, are pretty well covered for both their immediate and last half requirements. For third and fourth quarter deliveries we quote $64 Baltimore on 100-ton lots and on larger tonnages $63 Baltimore. For prompt shipments we quote $64 to $65 Baltimore according to the urgency of requirements. These quotations are on foreign 80 per cent ferro-manganese.

Imported 50 per cent ferro-silicon is quoted $110 Pittsburg; domestic 12 per cent, $36; 11 per cent, $35; 10 per cent, $34; with the lower grades imported ferro-silicon, $1 higher.

**Plates.**—The plate market presents no features not in common with other finished lines with the possible exception of steel bars and but very little current new business is being placed with the mills. Manufacturers are filled up to capacity for such a long period ahead that no active interest is being displayed, buyers knowing they can secure material for their requirements two or three months hence as easily as they can at the present time. Specifications are coming in regularly and in good volume against existing contracts. We quote:

Tank plate, ¼-inch thick, 6¼ to 100 inches, 1.80c to 1.90c f. o. b. mill Pittsburg for prompt shipment and 1.70c base Pittsburg on future deliveries. Extras are as follows per 100 pounds: Boiler and flange steel plates, 0.10c. A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than four inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1.00c. Gages under ¼-inch to and including 3-16-inch plate on thin edges, 0.10c; under 3-16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

**Sheets.**—While there is some new business coming in all the time, it is not in large tonnages and the trade is quiet. Specifications, however, are very heavy and mills are from three to six months behind. Prices are unchanged and we quote as follows:

Black steel sheets one pass, cold rolled, Nos. 11-12, 2.20c; Nos. 13-14, 2.25c; Nos. 15-16, 2.30c; Nos. 17-21, 2.35c; Nos. 22-24, 2.40c; Nos. 25-26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 29, 2.75c; No. 30, 2.85c; galvanized, Nos. 10-11, 2.65c; Nos. 12-14, 2.75c; Nos. 15-16, 2.85c; Nos. 17-21, 3.00c; Nos. 22-24, 3.15c; Nos. 25-26, 3.35c; No. 27, 3.55c; No. 28, 3.75c; No. 29, 4.00c; No. 30, 4.25c. Corrugated roofing, $1.85 per square for No. 28 painted, 2½-inch corrugation, and $3.25 per square No. 28.

**Tin Plate.**—The leading interest a few days ago officially announced its fourth quarter price as $3.90 on 100 pound coke. Conservative interests are acting slowly in regard to their requirements of tin plate for canning purposes, although there is a well defined impression that the frost reports on canning crops have been largely exaggerated and nothing definite as to the effects of the unseasonable cold weather on crops will be known short of two or three weeks. We quote as follows:

Coke tin plate 100-pound basis; 14 x 20, $3.90 f. o. b. mill, Pittsburg district. Terms, 30 days, less two per cent for cash in ten days.

**Rails and Track Material.**—The lull

in rail buying for next year's delivery, as has been noted for the past three or four weeks, still continues, and aside from the estimated 800,000 tons placed for next year out of the estimated requirement of 3,000,000 tons, no large contracts are expected until after the meeting of the joint commissions appointed by the railroads and the rail manufacturers, the railroads having already appointed their representatives and asked the rail makers to do the same. It is expected that this commission will meet some time within the next month or six weeks and thoroughly thresh out the difference of opinion existing between the two interests. While no radical changes in railroad specifications are expected as far as the material itself is concerned and no concerted movement is anticipated against Bessemer material, the new specifications will probably demand a change in the shape of the standard section. The tonnage placed with the local mills during the week under review was very light on standard sections, but reached 2,500 tons on light rails. We quote:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $40; 12-pound, $36 to $37; 16-pound, $35 to $36; 20-pound, $34 to $35; 25 to 45-pound, $33 to $34; angle splice bars for standard sections, $1.65; spikes for forward deliveries, $2.50.

**Hoops, Bands and Cotton Ties.**—There are no new developments in this market and business has been apparently quiet. The large cooperage interests are expected in the market some time during this month for their requirements for the year beginning July 1. We quote as follows:

Hoops in carload lots, 2c; in less than carload lots, 2.10c; bands, 1.60c; base half extras as per standard steel. Cotton ties, 95½c per bundle.

**Steel.**—The peculiar steel situation is not an unmixed evil and the scarcity of semi-finished material has brought about conditions quite unusual and with which the trade is just beginning to get familiar. The heavy demands upon the supply by finishing mills of the leading producers has practically taken them out of the market and with the exception of a few odd lots occasionally offered there is no steel in the open market at this time. Another feature which this scarcity has brought about is that two or three of the large independent producers have been selling their production in the shape of billets and slabs in preference to carrying it out to the finished product. This is due to the excessive demand for semi-finished material and the comparative price obtainable for the finished product. During the last week at least two such instances have been reported. Soft Bessemer billets are quoted nominally at $30.50 to $31 Pittsburg although in extreme cases 50 cents above this maximum has been paid. Sheet bars are quoted nominally $31 Pittsburg and several producers have refused to take on fair tonnages offered during the past few weeks, giving as an excuse the filled up condition of their order books, although some producers frankly state they are not quoting at this time and expect higher prices later in the year. Open-hearth steel billets are quoted nominally $32 to $33 Pittsburg.

**Merchant Bars.**—The steel bar market is in reality the only active point as far as new business is concerned in finished lines. The past week developed several surprises in the way of new business being placed and the agricultural implement people alone have contracted for over 100,000 tons or about one-third of their yearly business, this being divided between the Carnegie Steel Co., the Illinois Steel Co., the Republic Iron & Steel Co., Jones & Laughlin Steel Co. and the Cambria Steel Co. Outside of the agricultural implement people, a sale of between 50,000 and 60,000 tons of steel bars was made by the leading interest. All this business took the full card schedule and extras. Bar iron is a peculiar problem and while the market is nominally 1.75c to 1.80c for Pittsburg deliveries, one sale of a fair tonnage was made on the basis of 1.85c delivered Pittsburg and the seller announces that notwithstanding this premium price the material was not special test iron. We quote:

Common iron bars, 1.75c to 1.80c Pittsburg in carload lots and over; 1.80c to 1.85c in less than carloads; Bessemer steel bars, 1.60c net for forward deliveries; 1.85c to 1.90c out of stock; plow and cultivator, 1.60c net; channels, angles, zees, tees, under three inches, 1.70c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting, 50 per cent off in carload lots, and 5 per cent off in less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flats, 1.60c to 1.65c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15c. The price of planished and machine straightened tire is 1.80c base, half tire extras. Iron finished tire up to 1½ inch and over to be sold on regular bar basis of 1.60c base, half extras, steel card.

**Structural Material.**—The building business is undeniably quiet and inquiries are few in number and small in tonnage. The McClintic-Marshall Construction Co. during the week took on 1,800 tons of girder bridges, including one draw span and several 120-foot spans, as well as an order for sixteen 90-foot deck plate girder spans for a traction company. Another contract for a 700-ton railroad bridge was also placed. Most of the inquiry now being received by construction companies is from railroads and this is taken as a good indication of a revival along improvement lines by the large carrying interests. One inquiry of 8,000 tons, which was withdrawn two months ago, is again in the market. The mills are in fairly good position on shapes and delivery promises extend to the latter part of August or early September with the exception of very large sizes upon which much better deliveries can be made. This condition is largely due to the scarcity of semi-finished material and the way in which steel is being distributed. We quote as follows:

Beams and channels, 15-inch and under, 1.70c; over 15 inches, 1.80c; zees, 1.70c; tees, 1.70c; angles from three to six inches inclusive, 1.70c; over six inches, 1.80c; universal and sheared plates, 6¼ inches and wider, 1.80c base.

**Wire and Wire Nails.**—The large independent producer in this district has extended its delivery period to 60 days on account of the very heavy demands for its product, which largely exceeds the maximum mill output. There has been no let up in the demand for wire fencing, although the usual contract period for this material is nearly two months past. On account of the high price of semi-finished material an advance in wire nails within the next month is not improbable. We quote:

Wire nails, jobbers' carload lots, $2; retailers' carload lots, $2.05; less than carloads, $2.10; painted barb wire, $2.15, for jobbers in carloads; retailers in carloads, $2.20; and less than carload, $2.30, with 30c for galvanizing; plain wire, $1.85 for jobbers, and $1.90 by carload.

**Merchant Pipe.**—No change is noted in either the demand or price of merchant steel pipe and conditions remain as they have been for the past three months. The leading interest is making no delivery promises on new business booked, but the volume of new tonnage has in no way decreased and shipments are as far behind as they have been any time during the present heavy demand. While independent

producers are quoting 72 and five on base sizes black steel merchant pipe, we quote the following consumers' discounts of the leading interest subject to one point and five to jobbers in large lots:

| | —Steel— Black. | Galv. |
|---|---|---|
| ⅜ and ¼ inch | 65 | 49 |
| ⅜ inch | 67 | 53 |
| ½ inch | 69 | 57 |
| ¾ to 6 inches | 73 | 63 |
| 7 to 12 inches | 70 | 55 |
| EXTRA STRONG PLAIN ENDS. | | |
| ¼ to ⅜ inch | 58 | 46 |
| ½ to 4 inches | 65 | 53 |
| 4½ to 8 inches | 61 | 49 |
| DOUBLE EXTRA STRONG PLAIN ENDS. | | |
| ½ to 8 inches | 54 | 43 |

**Iron Pipe.**—The unprecedented demand for all sizes iron pipe continues and the manufacturers have in many instances refused to quote on account of exacting delivery requirements. On base sizes to consumers the official discount is 67. We quote:

| RANDOM LENGTHS WITH THREADS AND COUPLINGS —CARLOAD LOTS. | Blk. | Gal. |
|---|---|---|
| ⅛, ¼, and ⅜ inch | 59 | 43 |
| ½ inch | 62 | 51 |
| ¾ to 6 inches | 67 | 57 |
| 7 and 8 inch | 62 | 46 |
| PLUGGED AND REAMED. | | |
| 1 to 4 inch | 65 | 55 |
| CUT THREE TO SIX FEET. | | |
| ⅛, ¼, and ⅜ inch | 55 | 39 |
| ½ inch | 58 | 47 |
| ¾ to 6 inch | 63 | 53 |
| 7 and 8 inch | 58 | 42 |

**Boiler Tubes.**—This market is unchanged and we quote the following nominal discounts:

| | Iron. | Steel. |
|---|---|---|
| 1 to 1½ inch | 42 | 47 |
| 1¾ to 2¼ inch | 42 | 59 |
| 2½ inch | 47 | 61 |
| 2¾ to 3 inch | 52 | 65 |
| 6 to 13 inch | 42 | 59 |

2¼ inches and smaller, over 18 feet, 10 per cent net extra.
2¾ inches and larger, over 22 feet, 10 per cent net extra.

**Coke.**—During the week under review, there has been some little improvement in the demand for both furnace and foundry coke but prices continue very weak and spot furnace coke is quoted $2.10 to $2.20 at the ovens. Several furnace suspensions have been lifted, but to offset these about an equal number have asked producers to discontinue shipments. On last half contracts standard furnace coke is quoted $2.25 to $2.40, although the only active interest at this time has been from the east from furnaces usually taking Virginia and mountain coke unless Connellsville prices are very soft. Although higher prices have been quoted, last half foundry coke on contract can be secured at $3 to the consumer at the ovens. A fair sized transaction during the week and extending over the last six months was made at $2.85. The cause of the present peculiar condition regarding coke is a problem and in most quarters is attributed to overproduction. For the week ending Feb. 16 the production was 409,903 tons with 31,876 ovens in operation. The report for the week ending May 25 shows a production of 421,276 tons with 32,413 ovens in operation. These figures show an increase during four months of 11,373 tons for the respective period and 573 additional ovens in operation, which is indicative of a substantial basis for the over-production talk.

**Old Material.**—The flutter in steel scrap started by the dealers some time ago is still in effect and as high as $19 has been paid for heavy melting, although consumers ready to buy will not meet this price. The steel corporation is not in the market at the present time and has bought very little during the past month, but there is a rumor that it is prepared to buy scrap within a short time. In the Pittsburg district, there have been no large tonnage transactions although conditions are by no means bad—simply dull—and prices are very firm. For delivery in the Pittsburg district, we quote as follows:

Heavy melting scrap, $18.50 to $18.75; re-rolling rails, $19 to $19.50; bundled sheet scrap, $16 to $16.50; iron axles, $30.50 to $31; old iron rails, $23 to $23.50; No. 1 wrought scrap, $18.75 to $19; old car wheels, $24.50 to $25; low phosphorus scrap, $22.50 to $23; machine shop turnings, $15,25 to $15.75; axle turnings, $15.75 to $16; cast borings, $13.50 to $14; No. 1 cast scrap, $21 to $21.50.

## CHICAGO.

### Heavy Demand for Finished Material. —English Iron Purchased.

Office of THE IRON TRADE REVIEW,
1362 Monadnock Block, June 4.

Demand for finished material is monotonously active. New tonnage is limited only by the ability of mills to make deliveries. Every plant is crowded with specifications, and much complaint is heard of the difficulty to secure material. Jobbers are feeling the shortage very keenly, especially on merchant pipe, wire, plates and sheets, the demand for which from store has greatly increased since producers found themselves unable to satisfy their customers' wants. The principal business within the last week has been for fabricated shapes and rails. The Chicago & Northwestern placed its order with the local mill for 40,000 tons of standard sections, and the same interest and another road contracted for about 8,000 tons of bridge material. Demand for steel bars is subsiding, practically all the western implement manufacturers having covered their requirements for the year 1907-08. During the two months ending May 31, the local mill closed contracts with these interests for an aggregate of 10,000 tons. It is noteworthy also that there is a smaller number of unexpired contracts on hand for the season just closing than ever before at this time of the year. Current specifications from this source are very heavy. Scrap continues to enjoy a healthy demand, a marked tendency being apparent toward higher prices on all grades.

**Pig Iron.**—Close to 5,000 tons of Middlesbrough No. 3 foundry has been sold in this market within the past ten days on the basis of $25.85 Chicago. Shipments are specified to commence this month, the cargo being due at New Orleans in a few days. Very little trading has been transacted in domestic irons. A contract for 850 tons of southern No. 2 foundry was closed by a Birmingham producer for delivery in the first quarter of 1908, at $18.50 Birmingham, and a few scattering lots of northern iron for the same delivery were taken by local sellers on the basis of $25 Chicago for No. 2 foundry. No general interest is yet shown in these requirements, the contracts placed representing protection for castings ordered. Demand for spot iron continues apathetic, but prices remain firm at a minimum of $22.50 Birmingham for southern No. 2, and $27 Chicago for northern grades. Some irregularity exists in quotations for the fourth quarter, one seller quoting $20 Birmingham for this delivery. Interest in foundry irons for the last half is very light. The heavy melt of cast scrap is apparent in the constant demand for high silicon irons. Stiff prices are secured for these and early shipments are hard to obtain. Our quotations below are for the last half, the minimum being for the fourth quarter, and the maximum for the third quarter:

| | |
|---|---|
| Lake Superior charcoal | $ 27.50 |
| Northern Foundry No. 1 | 25.50 |
| Northern Foundry No. 2 | 25.00 |
| Northern Foundry No. 3 | 24.50 |
| Northern Scotch Foundry | 25.50 |
| Ohio Strong Softeners No. 1 | 24.80 to 25.30 |
| Ohio Strong Softeners No. 2 | 24.30 to 24.80 |
| Southern Foundry No. 1 | 24.85 to 26.35 |
| Southern Foundry No. 2 | 24.35 to 25.85 |
| Southern Foundry No. 3 | 23.85 to 25.35 |
| Southern Foundry No. 4 | 23.35 to 24.85 |
| Southern No. 1 Soft | 24.85 to 26.35 |
| Southern No. 2 Soft | 24.35 to 25.85 |
| Southern Gray Forge | 22.85 to 24.35 |
| Southern Mottled | 22.60 to 24.15 |
| Southern Silveries, 4 per cent to 6 per cent Silicon | 28.85 to 29.85 |
| Jackson Co. Silveries, 6 per cent. | 29.40 to 29.90 |
| Jackson Co. Silveries, 8 per cent. | 30.40 to 30.90 |
| Jackson Co. Silveries, 10 per cent | 31.40 to 31.90 |
| Malleable Bessemer | 25.00 |

**Billets and Rods.**—Quotations on wire rods remain unchanged at a minimum of $37 Pittsburg. Some tonnage is being taken right along, but producers are not actively seeking new business. The most noteworthy transaction in billets was an order for several thousand tons placed with a Pennsylvania mill. Another local consumer is figuring on a purchase of 5,000 tons of axle billets. Forging billets are without change in price at a range of $36 to $38 Chicago.

**Merchant Bars.**—Not in several years have steel bar contracts been so uniformly completed as they are at the close of the season of 1906-07. Instead

of carrying over a tonnage, as is usually the case, by far a great majority of the implement interests have consumed their reservations and not a few have exceeded their contract requirements. Contracting for deliveries in the year 1907-08 has been very heavy in the last two months, the tonnage taken in this period by the leading interest for its Milwaukee mill exceeding 100,000. The bulk of the western implement trade is now under contract, and buying is subsiding. It is a singular fact, however, in view of the persistent reports of crop failures, to note that the average implement contract for steel bars calls for a larger tonnage than was specified a year ago. Furthermore, specifications at this time are heavier than they have been for this period in many years, despite the fact that June, July and August are the months in which inventory is usually taken. Bar iron shows no loss in strength, local mills holding firmly at 1.60c Pittsburg as a minimum. There is a brisk demand from car and wagon shops, every western plant running to full capacity. We quote carload lots, Chicago delivery, as follows: Bar iron, 1.78c to 1.83c; soft steel bars and bands, 1.78c half extras; soft steel angles, less than 3 x 3, 1.88c; hoops, 2.18c base, full extras; planished or smooth finished tire steel, 1.98c; iron finish, up to 1½ x ½ inch, 1.93c base; iron finish, 1½ x ⅛ inch and larger, 1.78c base; channels for solid rubber tire ¾ to 1 inch, 2.28c, and 1⅛ inch and larger, 2.18c; smooth finished machinery steel, 2.18c; flat sleigh shoe, 1.83c; concave and convex sleigh shoe, 2.08c; cutter shoe, 2.36½c; toe calk steel 2.33c; railway spring, 1.98c; crucible tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are irregular, though the official prices are without change at 50 per cent off in car lots, and 45 per cent in less than carload lots, base territory. On iron and steel bars from local stocks, we quote as follows: Bar iron, 2.25c full extras; soft steel rounds, and square, 3 in. and larger, $2 per 100 pound base; flats, 2 inches to 4 inches by ⅛ inch and larger, $2 per 100 pounds base; 4½ inches by 5 inches and 6 inches by 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half rounds, $2 per 100 pounds base; steel bands, $2 half extras; soft steel hoops, $2.50 full extras. Other sizes not mentioned above, $2 per 100 pounds base, plus half extras.

**Plates.**—No change is noted in local conditions. New tonnage and specifications continue heavy. The leading producer is declining business, and for prompt shipment independent mills have no trouble in getting as high as 2c Pittsburg. We quote as follows:

Plates, ¼ inch and heavier, 6¼ to 100 inches wide, either universal or sheared, 1.70c to 2c Pittsburg base. For extras see Pittsburg report. Freight rate to Chicago, effective June 1, 18c per 100 pounds for carload lots, and 20c per 100 pounds for less than carload lots. Jobbers' prices for shipment from local stocks are as follows: Tank steel, ¼ inch and heavier up to 72 inches wide, 2.20c; 3-16 inch up to and including 60 inches wide, 2.30c; 3-16 inch 72 inches wide, 2.55c; No. 8 up to 60 inches wide, 2.50c. Flange steel, 25c extra; heads, 25c extra.

**Sheets.**—The congestion of orders and specifications on mill books is slowly being unraveled. Deliveries are not now so remote, 10 to 12 weeks being asked for galvanized, and 8 to 10 weeks on black sheets. New business is plentiful, and prices are firm. We quote as follows:

Black sheets, Nos. 8, 9 and 10, 1.90c Pittsburg; No. 28, 2.60c Pittsburg. Galvanized sheets, No. 28, 3.75c Pittsburg. Freight to Chicago, 18c per 100 pounds for carload lots, and 20c for less than carload lots. Jobbers' prices on carload lots and less from store are as follows:

No. 10, 2.50c to 2.55c; No. 12, 2.55c to 2.60c; No. 14, 2.60c to 2.65c; No. 16, 2.70c to 2.80c; Nos. 18-20, 2.80c to 2.90c; Nos. 22-24, 2.85c to 2.95c; No. 26, 2.90c to 3c; No. 27, 2.95c to 3.05c; No. 28, 3.05c to 3.15c; No. 30, 3.35c to 3.45c. Galvanized sheets, No. 10 to 20, 3.50c to 3.55c; Nos. 22 and 24, 3.65c to 3.75c; No. 26, 3.85c to 3.90c; No. 27, 4.05c to 4.15c; No. 28, 4.25c to 4.35c; No. 30, 5.40c to 5.45c.

**Structural Steel.**—The Wisconsin Bridge Co., Milwaukee, secured the contract from the Chicago & Northwestern Railway for the bridge across the Mississippi river, at Clinton, Ia., which will require 4,500 tons of steel shapes. The C. M. & St. P. Ry. awarded the American Bridge Co., the contract for several small bridges, aggregating 1,900 tons of shapes. Bids have been asked this week for the erection of an addition to the Wisconsin capitol at Madison, 800 tons, and for the new plant of the Southern California Cement Co., Riverside, Cal., 1,000 tons. Local mill conditions are satisfactory to producers, specifications in hand amounting to two months' output. Prices are without change as follows:

Beams and channels, 3 to 15 inches inclusive, 1.70c Pittsburg. For extras see Pittsburg report. Freight rate from Pittsburg to Chicago, 18c per 100 pounds for carload lots, and 20c per 100 pounds for less than carload lots. Quotations from store are as follows:

All angles, three inches and larger, including six inches, $2.10 per 100 pounds; angles over six inches, $2.15 per 100 pounds base; beams, 3 to 15 inches inclusive, $2.10 per 100 pounds base; channels, three inches and larger, $2.10 per 100 pounds base. Less than carload lots are $1 a ton higher than foregoing prices.

**Rails and Track Supplies.**—The only important contract for 1908 rails taken in the week under review was that of the Chicago & North Western railway for 40,000 tons. This and an order for 4,600 tons for the same delivery totals the week's business. There is a brisk demand for spikes and bolts for this year's shipments, but only a limited tonnage is available. Light rails continue in good demand and prices are firm. We quote as follows:

Bessemer rails, $28 to $30; less than 500-ton lots, $32; open-hearth rails, $29; light rails, Bessemer, 30 to 45-pounds sections, $35; 25-pound, $36; 20-pound, $37; 16-pound, $38; 12-pound, $39, and lighter sections down to 8-pound, $45.50, all f. o. b. mill. Track supplies vary in price according to quantity and delivery. On orders accompanying rail contracts for future delivery, we quote angle bars, 1.65c; spikes, 2.35c; bolts with square nuts, 2.65c; with hexagon nuts, 2.80c. For carload lots or less, for prompt shipment, the following prices are asked: Angle bars, 2.25c to 2.75c; spikes, 2.60c to 2.70c; bolts with square nuts, 2.85c; with hexagon nuts, 3c.

**Cast Iron Pipe.**—The high prices asked for pig iron are blamed for the diminished demand for cast iron pipe. Nothing of importance has been closed in the past seven days, nor are any large contracts pending. One large maker of pipe estimates the loss of business this year as a result of the high prices at 25 per cent to 30 per cent of the total placed. No change has occurred in prices, which continue as follows: Four-inch water pipe, $38.60; 6 to 12-inch inclusive, $37.60; 16-inch and upward, $36.60; gas pipe, $1 a ton higher.

**Merchant Pipe and Boiler Tubes.**—Reasonably early delivery can be given on a few sizes of iron pipe, but on black and galvanized steel pipe, and boiler tubes, mills are congested with orders and specifications. The entire output goes into immediate consumption, no stocks having been accumulated. This condition tends to deplete jobbers' stocks more rapidly than usual owing to the increased demand and these interests are having considerable trouble in maintaining a full complement of sizes. Prices are very firm. Mill quotations, carload lots, Chicago delivery, are given below. On steel pipe, jobbers are entitled to one point

and five per cent additional. Inquiries for wrought iron pipe are referred to the home offices for prices.

MERCHANT PIPE.

| | —Steel— Black. | Galv. |
|---|---|---|
| ¼ to 6 inches, inclusive..... | 71.2 | 61.2 |

BOILER TUBES.

| | Steel. | Iron. |
|---|---|---|
| 2¼ to 5 inches, inclusive..... | 62.2 | 49.2 |
| Old Steel Rails, 3 ft. and under. | $18.50 to 19.50 | |

Chicago jobbers' prices on steel pipe are as follows: It is to be noted that a concession of one-half to one point is allowed on carload orders.

MERCHANT PIPE.

| | Black. | Galv. |
|---|---|---|
| ⅛ to ¼ inch..... | 60 | 44 |
| ⅜ inch ..... | 62 | 48 |
| ½ inch ..... | 64 | 52 |
| ¾ to 6 inches..... | 68 | 58 |
| 7 to 12 inches..... | 64 | 49 |

Minimum prices for wrought iron pipe, carload lots or greater, are as follows: ⅛ in. to ¼ in., 55; ⅜ in., 57; ½ in., 59; ¾ in. to six inches, 64; 7 in. to 12 in., 59. Boiler tubes from store are unchanged at 60 off for steel; 47½ for iron, and 42½ for seamless, base sizes, 2¼ inches to 5 inches.

**Wire Products.**—There is a slight falling off in the demand for nails, and mills are gradually overtaking their delinquent deliveries of this material. On new business, three to four weeks' delivery can now be guaranteed. The movement in barb wire continues heavy, and the shipment of this product is slow. Smooth wire is in brisk demand, fabricators specifying heavily against contracts. Prices are without change as follows:

Wire nails, $2.15; painted barb wire, $2.30; galvanized barb wire, $2.60; smooth annealed wire, $2.30; polished staples, $2.55. Carload lots to retailers, five cents higher; less than carload lots, 15 cents higher.

**Coke.**—The coke market shows no gain in strength. Inquiry continues light and prices are soft. Connellsville producers are asking from $3 to $3.15 ovens for standard foundry brands for any delivery this year.

**Old Material.**—Scrap is moving contrary to all expectations. Instead of a declining market, the natural expectation at midsummer, prices continue on the upward grade. To a considerable extent this condition is due to the marked strength in other lines, but the inter-trading among dealers has developed a good portion of it. A great many sold heavily in the spring for current delivery in anticipation of buying at a profit in the summer, but the cool weather, enabling mills to operate without cessation; the continued brisk demand for all forms of finished material, and the scrap shortage in eastern markets prevented the usual slump in prices. Many dealers found themselves short and facing an insistent demand from mills and foundries for the specified deliveries. Stocks in local yards are low, and country dealers and railroads are not offering as heavily as usual at this time of the year. Hence the rapid jump in prices. The market is very sensitive, and any slight recession in any other lines would result in a loosening of present prices. Two new lists are offered this week, one by the Santa Fe for 3,500 tons, and one by the Wisconsin Central for 750 tons. We have corrected several prices, and quote as follows, gross tons being given in the first paragraph:

| | |
|---|---|
| Old Car Wheels..... | 25.25 to 25.75 |
| Old Iron Rails ..... | 24.50 to 25.00 |
| Rerolling Rails (3 feet and over) | 19.00 to 19.50 |
| Light Section Relayers, 45 lbs. and under, subject to inspection... | 30.00 to 32.00 |
| Relaying Rails, subject to inspection ..... | 28.00 to 30.00 |
| Frogs, Switches and Guards.... | 17.50 to 18.00 |
| Heavy Melting Steel..... | 16.50 to 17.00 |
| Mixed Country Steel..... | 12.50 to 13.00 |

We quote net tons as follows:

| | |
|---|---|
| No. 1 R. R. Wrought..... | $16.00 to 16.50 |
| No. 2 R. R. Wrought..... | 15.00 to 15.50 |
| Shafting ..... | 17.75 to 18.25 |
| Dealers Forge No. 1..... | 13.00 to 13.50 |
| Pipes and Flues ..... | 12.50 to 13.00 |
| No. 1 Cast, 150 lbs. and less... | 19.00 to 19.50 |
| No. 1 Mill..... | 10.00 to 10.50 |
| Mixed Busheling (Nos. 1 and 2) | 12.00 to 12.50 |
| Country Sheet ..... | 8.75 to 9.25 |
| No. 1 Boiler Cut ..... | 11.75 to 12.25 |
| Boiler Punchings ..... | 15.00 to 15.50 |
| Cast Borings ..... | 10.50 to 11.00 |
| Mixed Borings, etc..... | 10.50 to 11.00 |
| Machine Shop Turnings..... | 12.50 to 13.00 |
| Railroad Malleable ..... | 17.25 to 17.75 |
| Agricultural Malleable ..... | 16.00 to 16.25 |
| Stove Plate and Light Cast Scrap | 15.50 to 16.00 |
| Old Iron Splice Bars..... | 19.00 to 19.50 |

## CINCINNATI.

### Sales of Pig Iron Light.—Prices Unchanged.—Spot Coke Lower.

June 4.

**Pig Iron.**—Consumers' current supplies are apparently ample for their needs and the demand for spot iron is light in this market with prices unchanged. Sales of prompt iron are on the basis of $21.50 to $22, Birmingham, for southern brands with northern spot almost an unknown quantity. We quote spot iron delivered Cincinnati as follows:

| | |
|---|---|
| Southern foundry No. 1..... | $25.25 to 25.75 |
| Southern foundry No. 2..... | 24.75 to 25.25 |
| Southern foundry No. 3..... | 24.25 to 24.75 |
| Southern foundry No. 4..... | 22.50 to 22.75 |
| Southern No. 1 soft..... | 25.25 to 25.75 |
| Southern No. 2 soft..... | 24.75 to 25.25 |
| Southern gray forge..... | 21.75 to 22.25 |
| Northern No. 1 foundry..... | 25.65 to 26.65 |
| Northern No. 2 foundry..... | 25.15 to 26.15 |
| Northern No. 3 foundry..... | 24.65 to 25.65 |

June delivery and third quarter are now practically on the same basis with sales of southern iron at $21 to $21.50 Birmingham. For the last quarter of the year $19.50 Birmingham is minimum, and this is rather hard to obtain, but $20 Birmingham is freely quoted. For the first quarter of 1908 the recently established prices are still quotable, viz., for southern brands $18.50 Birmingham and for northern lakes $22 at furnace.

The actual business in this territory during the past week has been light and the market has ruled quiet. The excitement which prevailed about three weeks ago has subsided and the trade has accepted the present level of values as normal, based on the understood conditions. In other words, the market has settled to the present basis after the heavy buying movement was over and the situation is regarded as strong at present quotations. Consumers are calling for iron due them on contracts and are taking their deliveries in a manner that indicates good consumption. Northern furnaces in southern Ohio have practically sold all the heavy iron they will be able to make for the balance of this year. The southern stacks that still have iron to sell for this year will therefore have the benefit of a large part of the demand that will come from consumers in this territory who have not provided for their wants for third and fourth quarter. It is generally believed that there will be enough demand of this kind to absorb the offerings. We quote for last quarter delivery, delivered Cincinnati, as follows:

| | |
|---|---|
| Southern Foundry No. 1..... | $23.25 to 23.75 |
| Southern Foundry No. 2..... | 22.75 to 23.25 |
| Southern Foundry No. 3..... | 22.25 to 22.75 |
| Southern Foundry No. 4..... | 21.75 to 22.25 |
| Southern Foundry No. 1 soft... | 23.25 to 23.75 |
| Southern Foundry No. 2 soft... | 22.75 to 23.25 |
| Gray Forge ..... | 20.75 to 21.00 |
| Northern foundry No. 1..... | 24.65 to 25.15 |
| Northern Foundry No. 2..... | 24.15 to 24.65 |
| Northern Foundry No. 3..... | 23.65 to 24.15 |

**Finished Material.**—The market is fairly active for small lots and quotations are unchanged. Small orders are filled here at the following prices:

Angles, 3 x 3 and over, 2.15c to 2.25c; beams and channels, 15 inches and under, 2.15c; small angles and architectural channels, 2.10c base; plates ¼ inch and heavier, 2.10c; 3-16 inch 2.20c; No. 8, 2.20c; sheets (blue annealed) No. 10, 2.30c; No. 12, 2.35c; No. 14, 2.40c; No. 16, 2.50c; box annealed sheets, Nos. 18 and 20, 2.65c; Nos. 22 and 24, 2.75c; Nos. 25 and 26, 2.80c; No. 27, 2.85c; and No. 28, 2.95c. Iron and steel bars, 2.00c base; boiler tubes, 60 per cent off base; turnbuckles, 45 per cent off; rivets, 3.15c base; cold rolled shafting, 45 per cent off list; steel tire, 2.10c base.

**Coke.**—Conditions for coke operations have been quite favorable to output and this has caused free offerings, resulting in lower prices. The demand on contracts is good and spot coke is in fair request, but deliveries are good, as transportation is easy, so that spot coke is lower than contract. There is a heavy tonnage being booked, but the eagerness of the ovens for business has brought about an unsettled market.

Prices quoted in the leading coke producing districts are as follows:

| | |
|---|---|
| Wise County, Va., Furnace Coke, prompt shipment | $2.60 to 2.75 per ton |
| Wise County, Va., Foundry Coke | 3.25 to 3.40 per ton |
| Pocahontas Furnace Coke, prompt shipment | 2.60 to 2.75 per ton |
| Pocahontas Foundry Coke | 3.00 to 3.25 per ton |
| Connellsville Furnace Coke, prompt shipment | 2.50 to 2.75 per ton |
| Connellsville Foundry Coke | 3.00 to 3.50 per ton |
| New River Foundry Coke, promnt shipment | 3.25 to 3.40 per ton |
| New River Furnace Coke, contract | 2.75 to 2.90 per ton |

*Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.60 to $1.65 per ton on $9.00 pig iron, plus 17 to 18 per cent of the advance on pig iron above $9.00 Birmingham.

**Old Material.**—The market rules steady with a firm undertone. Dealers are not urging their offerings and are inclined to hold for current quotations. We quote:

| | |
|---|---|
| Old No. 1 R. R. wrought net tons | $16.50 to 17.50 |
| Cast machine and f'dy, net tons | 18.50 to 19.50 |
| Old iron rails, gross tons | 24.50 to 25.50 |
| Old steel rails, gross tons | 18.00 to 19.00 |
| Old short lengths, gross tons | 18.50 to 19.50 |
| Old iron axles, net tons | 26.50 to 27.60 |
| Heavy melting scrap, gross tons | 21.50 to 22.00 |
| Stove plate, net tons | 15.00 to 16.00 |
| Wrought turnings, net tons | 13.00 to 13.50 |
| Cast borings, net tons | 11.50 to 12.00 |
| Car wheels, gross tons | 24.00 to 24.50 |

## PHILADELPHIA

### Pig Iron Quiet, but There Are No Signs of Weakness.

June 4.

**Pig Iron.**—The market is quiet, as compared with the excited buying of a few weeks ago, but there is not the slightest sign of weakness. Indeed, it is difficult to see how there can be any material recession in prices for some time to come. While there has been a good deal of buying during the past month, it is known that there are many consumers who have not yet covered their requirements for the last quarter, and even some who are still shy on their third quarter purchases. Buying by these will furnish all the stimulus the market needs for some time. Inquiries are being made for the first quarter of 1908, but the sales as yet are not numerous. An interesting transaction for that period is reported by a long established producer, who sold 3,000 tons of No. X foundry for $23.50 furnace, which is equivalent to $24.25 Philadelphia. The significant feature of the sale is that the price is exactly the same as that asked for last quarter iron, which shows that one furnace at least is confident of the present activity extending well into 1908. Handsome premiums are still paid for spot iron, which is extremely scarce. No. 2X foundry for June delivery has gone as high as $26.50. There has been no change in English iron, and for the last half domestic prices show substantially no change, the outer range representing third quarter figures, as follows:

| | |
|---|---|
| No. 1X Foundry | $25.50 to 26.00 |
| No. 2X Foundry | 24.25 to 25.00 |
| No. 2 Plain | 23.75 to 24.25 |
| Standard Gray Forge | 22.75 to 23.25 |
| Basic | 23.50 to 24.00 |
| Low Phosphorus | 27.00 to 27.50 |

**Finished Material.**—The market is without any especially noteworthy features. Orders come in steadily, though not in as great volume as some months ago, and the mills are reasonably assured of no serious diminution in business before October. Structural material and steel bars are in most demand and prices are quoted at the figures which have ruled unchanged for some time. Beams, channels and angles, according to specifications, 1.83½c to 2c; refined iron bars, 1.83½c to 1.88½c; steel bars, 1.83½c to 1.88½c; plates, 1.98½c to 2.03½c.

**Old Material.**—The market is firm, with almost no price changes, but the buying does not cover as far ahead as dealers would like. The mills seem to be following a conservative policy, in view of the present high prices, and their stocks are sufficient for only a comparatively short time. Prices show only a single advance, in forge fire scrap, as follows:

| | |
|---|---|
| Old steel rails | $19.50 to 20.00 |
| No. 1 steel scrap | 19.00 to 19.50 |
| Old steel axles | 22.50 to 23.00 |
| Old iron axles | 31.00 to 32.00 |
| Old iron rails | 27.00 to 28.00 |
| Old car wheels | 24.00 to 25.00 |
| Choice scrap R. R. No. 1 wrought | 20.50 to 21.00 |
| No. 1 yard scrap | 18.50 to 19.00 |
| Machinery Scrap | 21.50 to 22.00 |
| Low phosphorus scrap | 23.50 to 24.00 |
| Wrought iron pipe | 16.00 to 17.00 |
| No. 1 forge fire scrap | 17.00 to 17.50 |
| No. 2 forge fire scrap, ordinary | 11.50 to 12.00 |
| Wrought turnings | 17.00 to 17.50 |
| Axle turnings, heavy | 17.00 to 17.50 |
| Cast borings | 16.25 to 16.75 |
| Stove plates | 17.50 to 18.00 |

## NEW YORK.

### New England Pig Iron Consumers Well Supplied.—Little New Business.

Office of THE IRON TRADE REVIEW.
Room 1005, No. 90 West St., June 4.

**Pig Iron.**—Interesting information is available as to the extent to which eastern pig iron consumers have covered their requirements for the remainder of the year. An important selling interest has canvassed its customers in New England and finds that fully 90 per cent will require no more iron until the fourth quarter, while about 65 per cent are covered through the year. In northern New York, another interest reports the situation as practically the same. About New York city and south, the proportion of those covered is much less and considerable iron will be needed before the year is out. Two large consumers will have to purchase some 6,000 tons each, a part of this tonnage in the early future, and a goodly number of smaller melters will be forced into the market a little later. To offset these demands, there is very little unsold iron in prospect. Not a few interests are out of the market, except for occasional spot lots of small tonnage, and eastern furnaces on an average have the better part of their last quarter output disposed of. At a recent meeting of the Eastern Pig Iron Association it developed that only one interest could offer any considerable tonnage for third quarter iron. The market of the past week has developed little new business, however, and has been extremely quiet, but this condition, following the record business of May, has brought with it no weakening in prices and it is difficult to see wherein there is any prospect of a lower level. A moderate sale of No. 1X, August to December delivery, is reported at $24.50 furnace. There has been some further selling for the first quarter in foundry and malleable and some large inquiries are pending.

The British market continues active, closing Monday at 61s 6d for No. 3 Middlesbrough. May 24 the stock of No. 3 in Connal's yard was down to 334,000 tons. At tidewater, Atlantic ports, this iron is selling at $22.00 to $23.00, according to delivery, and cargoes to arrive late in August are well disposed of. When it is considered that this yard contains the only large quantity of iron in the world today and that this tonnage is considerably smaller than that turned out by the United States every five days or by the world's furnaces in three days, it is evident that iron consuming interests are running on a pretty close margin.

An advance in freight rates on coke is announced for July 1. The market is more firm, in that the weakening tendency has apparently been checked. At the ovens, foundry coke prices range from $3.00 to $3.25 for last half delivery and from $3.25 to $3.50 for yearly contracts. On pig iron we quote tidewater prices as follows, the higher figures being for prompt shipment:

| | |
|---|---|
| Northern Foundry No. 1 | $24.00 to 26.00 |
| No. 2X Foundry | 23.50 to 26.00 |
| No. 2 Plain | 23.00 to 25.50 |
| No. 2 Southern Foundry | 23.50 to 26.00 |
| Basic | 23.00 to 24.50 |

**Ferro-Manganese.**—The situation is unchanged from that of a week ago, with only a moderate volume of new business. For 80 per cent, $65.00 to $66.00, tidewater, is asked for early shipment. Later delivery can be had at $63.00 to $64.00.

**Finished Materials.**—In the structural field, business has been extreme-

ly light during the week and no large tonnages are included in the contracts reported as closed. Prospective work, however, aggregates a considerable amount. Steel is yet to be purchased for the Lawyers' Title and American News buildings, for the Gould residence and another public library. Some subway extension work is pending and there is a prospect of two large power houses requiring heavy tonnages being constructed. As predicted last week, the bookings of the American Bridge Co. for May were about 40,000 tons, or about one-fifth of the total lettings. This interest is to furnish 2,000 tons of bridge work for the St. Paul system. Competition for new structural business is very keen and contracts are being closed at unusually low figures. At San Francisco, new business is at a standstill, labor difficulties having become so acute as to frighten financial interests backing the rebuilding of the city.

Plate business is reported as moderate, with one inquiry for 1,000 tons for early delivery in the market. New business in bar iron is not large, though specifications are brisk. Billets and structural materials are in only moderate demand. The recent advance in freight rates has added one and one-half cents to delivered prices, which we quote as follows for tidewater:

Angles, 3 to 6 inches x ¼ inch and heavier, 1.86c; beams, 3 to 15 inches, 1.86c; tees, 3 x ¼ and heavier, 1.91c; plates, carloads, tank, 1.96c; marine boiler, 2.26c; bar iron, 1.86c; soft steel bars, 1.76c; sheets, No. 28, black, 2.60c.

**Old Materials.**—The week has seen a continuance of the easier tone noted in the last report, with the volume of business only moderate and no large tonnages involved. Heavy cast scrap is much weaker, so far as demand is concerned, but prices heretofore prevailing are maintained. Some bar mills are complaining of lack of orders, which accounts for this condition. On the other hand, the inquiry for steel scrap is extremely good and mills are insisting upon deliveries to such an extent that the market is being scoured for all available. Other lines present few changes. We quote, New York delivery, gross tons, as follows:

| | |
|---|---|
| Old iron rails | $24.50 to 25.50 |
| Old steel rails, long lengths | 18.00 to 18.50 |
| Old steel rails, short pieces | 16.25 to 16.75 |
| Relaying rails | 28.00 to 29.00 |
| Old car wheels | 24.00 to 24.50 |
| Old iron car axles | 28.50 to 29.50 |
| Old steel car axles | 21.00 to 21.50 |
| Heavy melting steel | 16.75 to 17.25 |
| No. 1 railroad wrought | 18.00 to 18.50 |
| Iron track scrap | 17.00 to 17.50 |
| Wrought pipe | 14.00 to 14.50 |
| Cast borings | 14.00 to 14.50 |
| Wrought turnings | 14.75 to 15.25 |
| Heavy cast scrap | 18.75 to 19.25 |
| Railroad malleable | 17.00 to 18.00 |
| Agricultural malleable | 15.00 to 16.00 |
| Stove plate | 15.50 to 16.00 |
| Grate bars | 14.50 to 15.00 |

Nash, Isham & Co., 82 Beaver street, New York, have opened an office at 621 Board of Trade building, Boston. It will be in charge of F. F. Newcomb, formerly connected with the Philadelphia office of Rogers, Brown & Co.

## BUFFALO

### Pig Iron Market Very Quiet—Some Offers of Spot at High Prices.

June 3.

**Pig Iron.**—The market has been quiet almost to dullness for a week, and no particular activity is looked for prior to July 1. Prices, however, hold up firm with no indication of any immediate change. It is reported that some selling continues into the early months of the coming year and there is still some business being done for last quarter delivery. There have been a good many inquiries during the last few days for spot, but none has been obtainable at the local furnaces.

Some offers have been made within the past day or two by furnaces in other districts of spot iron at stiff prices, and small quantities have been placed in this district. Most of the spot offered is high silicon iron. A strong demand for malleable Bessemer has been noted here, most of the inquiries being for immediate or very early deliveries.

Inquiries continue coming in for prices on first quarter, 1908 deliveries, some of which are from the largest consumers looking to this district for supply. The local foundries are not consuming as much iron as they did the first few months of the year. Apparently the demand from the foundries will be slack for some little time, their present needs being taken care of. Many, too, have covered well into the future, some to the end of the present year. It is certain that the foundries are not rushed as they were throughout the earlier months of the year. Conditions are now about normal, but strong business is said to be in sight. For last quarter delivery we quote as follows:

| | |
|---|---|
| No. 1X Foundry | $23.75 to 24.00 |
| No. 2X Foundry | 23.00 to 23.50 |
| No. 3 Foundry | 22.75 to 23.00 |
| No. 2 Plain | 22.50 to 23.00 |
| Malleable Bessemer | 23.00 to 23.50 |
| Gray Forge | 22.00 to 22.50 |
| Charcoal | 27.00 to 27.50 |

A strike of machinists has been called at the Chicago Heights plant of Chalmers & Williams.

## ST. LOUIS

### Pig Iron Market Active—Surplus of Low Grades—New Buildings.

June 3.

**Pig Iron.**—The market is still lively, iron being sold at $23.00 to $23.50 f. o. b. Birmingham, for spot shipment, and is hard to obtain. A surplus of low grades is reported, with a dearth of No. 1 and No. 2. Prices for the last quarter of this year are No. 2, f. o. b. Birmingham, $20.50, and with only one large furnace interest offering for that delivery. There is a continual stream of inquiries for small tonnages for shipment during the third quarter. Iron for that delivery is being offered at from $22 to $23 f. o. b. Birmingham. The market is strong, but the majority of foundrymen have covered for their requirements.

Our quotations for spot delivery, f. o. b. Birmingham, to which the freight of $3.75 is to be added, follow:

| | |
|---|---|
| No. 1 Southern | $23.50 to 24.00 |
| No. 2 Southern | 23.00 to 23.50 |
| No. 3 Southern | 22.50 to 23.00 |
| No. 4 Southern | 22.00 to 22.50 |

**Coke.**—The demand for coke is fairly good, but prices are not up. We quote 72-hour Connellsville, f. o. b. ovens, at $3.25 to $3.50. The freight to East St. Louis is $2.80, and to St. Louis, $2.90. There appears to be no tendency towards a slump. The ovens are well up with their deliveries, and prompt shipments are available. DeCamp Bros. & Yule, of St. Louis, during the last week sold 25,000 tons of furnace coke for shipments in equal monthly quantities during the remainder of this year.

**Steel.**—Prices of steel remain the same as last report. Architect Isaac S. Taylor has been awarded a contract for plans for a nineteen story steel office structure, to be erected at the southwest corner of Broadway and Market streets, which will probably require 2,000 tons of steel. Mr. Taylor has also been commissioned by the city of St. Louis to prepare plans for a municipal building to occupy the entire city block bounded by Thirteenth, Fourteenth, and Market streets and Clark avenue. The estimated cost of this building is $2,000,000. Mr. Taylor probably will begin the plans of the two buildings within the next two weeks.

**Scrap Iron.**—The scrap iron market is reported to be in a healthy condition, with a heavy demand from foreign trade. Our quotations, f. o. b. cars East St. Louis, or St. Louis, follow:

| | GROSS TONS |
|---|---|
| Steel rails (less than 3 feet) | $17.50 |
| Car wheels | 25.00 |

| | |
|---|---|
| Iron rails | 24.50 |
| Rerolling steel rails | 18.00 |
| Heavy melting steel | 17.50 |
| Country steel mixed | 16.00 |
| | NET TONS |
| No. 1 R. R. wrought | $17.50 |
| No. 2 R. R. wrought | 16.00 |
| Iron splice bars and fish plates | 19.00 |
| Iron car axles | 24.60 |
| Steel car axles | 19.50 |
| Locomotive tires, smooth inside | 15.50 |
| Iron shaftings (3 to 6 inches) | 19.00 |
| Country wrought | 15.00 |
| Pipes and flues | 13.00 |
| Heavy machinery | 17.50 |
| R. R. cast (less than 300 pounds) | 17.50 |
| No. 1 Busheling | 14.00 |
| No. 2 Busheling | 13.50 |
| Boiler sheet and rings | 13.00 |
| R. R. cast borings (free of inferior quality) | 10.50 |
| R. R. wrought turnings | 13.50 |
| Machine shop turnings (free from brass) | 12.50 |
| Railroad malleable | 16.50 |
| Agricultural malleable | 15.25 |
| Cast stove plate | 14.50 |

## BIRMINGHAM, ALA.

### Demand Not So Brisk, But Market Conditions Are Favorable.

June 4.

While the demand recently has not been so strong as before, southern pig iron manufacturers are perfectly satisfied with conditions. Sales agents are being called off by some of the Alabama manufacturers from the open market, the regular customers and those who purchase from hand to mouth being in sufficient numbers, it is argued, to care for the iron that is left for delivery during the last half of the year. Inquiries being received by the manufacturers here are in the main just for information, but it is believed that much business will result. Quotations are firm, No. 2 foundry iron for delivery during the fourth quarter being as high as $21 while for the first quarter in the coming year $18.50 per ton, No. 2 foundry, is the steady price. Even at the last named price, there is a good profit. The companies in this district calling off their sales agents assert that their order books are so well supplied with business that they are in position to sit and wait for the consumers to hunt them instead of going out after the consumers.

The production in this section shows no improvement to amount to anything as yet. The Tennessee Coal, Iron & Railroad Co. is to blow in a furnace in the next few days. The Sloss-Sheffield Steel & Iron Co. should get its two furnaces in blast this month. Other furnaces are still under repairs. It is stated that some of the furnaces now in operation will shortly need repairing.

Raw material supplies are steady. The attention that has been given lately to the ore supplies is having result. Several new ore mines were recently developed and the furnaces are not running so short nowadays on ore. Coke has been plentiful for some time and is weak in price. Coal, limestone or dolomite is plentiful. In fact, the raw material supplies appear to be plentiful and the railroads are giving good service from the mines to the furnaces.

Inquiry elicits the information that the sales made by Alabama furnace companies for delivery during the last quarter of the year cover a large portion of the probable make while already a great showing is being made on the output expected during the first three months of next year.

## CLEVELAND.

### Large Increase in Ore Shipments.—Pig Iron Market Quiet.

Office of THE IRON TRADE REVIEW, Browning Building, June 4.

**Iron Ore.**—Owing to the large number of vessels which have arrived within a few days at lower lake ports, there has been a congestion in traffic, the docks having more than they could do. The shipments for the past month show a gratifying increase compared with last year, the total being 5,621,285, against 4,304,954 tons in May, 1906, and 4,619,431 tons in May, 1905. Last year there were 10 inactive days on the docks on account of the strike then in progress, but weather conditions this year were much more unfavorable than last year. The decrease up to May 1 of 816,411 tons has been overcome, and the total is greater by 499,921 tons up to June 1.

There has been a decided car shortage during the week, and it is becoming more apparent that the railroads will have all they can do to handle the immense shipments which will be made during the season.

**Pig Iron.**—The quiet reported last week has continued, but prices are firm and a limited amount of business is being done for the last half of the year with an occasional sale for the first quarter of 1908. Prices are unchanged. We quote, f. o. b. Cleveland, for last half delivery, as follows:

| | |
|---|---|
| Bessemer | $23.90 |
| No. 1 Foundry | 24.50 |
| No. 2 Foundry | 24.00 |
| No. 3 Foundry | 23.50 |
| No. 2 Southern | 24.35 |
| Gray Forge | 22.50 |

**Coke.**—Most producers report little, if any, improvement, either in demand or prices, and some very low prices have been named on spot furnace coke, which we quote at $2 to $2.15, and for last half at $2.15 to $2.25. For last half delivery, foundry coke is selling from $3.15 to $3.25.

**Finished Material.**—New business has not been coming in in large volume. Specifications are still heavy and there are no indications of an unfavorable character. The demand for steel bars is fair and the improvement in bar iron noted last week is maintained. The principal producer of bar iron is delivering in from six to eight weeks and has declined to accept premiums for earlier delivery. It is estimated that about 90 per cent of the steel bar tonnage required for implement manufacturers for the year beginning July 1 has been covered. Forging billets in small lots have been advanced from $34 to $40, Johnstown, Pa.

**Old Material.**—The feature of the market is the heavy buying between dealers, as generally stocks are low and insufficient to fill requirements on contracts with mills and foundries. The market is more than holding its own, and some increase in strength is noted.

All grades with the exception of wrought scrap are in good demand, especially cast scrap and stove plate. Some dealers expect the strengthening conditions to continue throughout June. The B. & O. railroad has closed at good prices on a lot of 7,000 tons, and the Pennsylvania lines west with several thousand tons, the C. H. & D. with 1,000 tons and the Big Four with 1,000 tons will make awards this week. We have revised our prices, and quote, f. o. b. Cleveland, gross tons, as follows:

| | |
|---|---|
| Old iron rails | $24.00 to 25.00 |
| Old steel rails (re-rolling) | 17.75 to 18.75 |
| Old steel rails (under 6 feet) | 17.50 to 18.50 |
| Old car wheels | 24.00 to 25.00 |
| Steel boiler plate | 14.50 to 15.00 |
| Steel axles | 22.00 to 23.00 |
| Malleable iron (railroad) | 19.00 to 19.25 |
| Malleable iron (agricultural) | 17.25 to 17.75 |
| Heavy steel | 16.75 to 17.25 |
| Country mixed steel | 15.25 to 15.75 |
| Low phosphorus | 21.50 to 22.50 |

We quote net tons as follows:

| | |
|---|---|
| No. 1 R. R. wrought | $16.50 to 17.00 |
| No. 1 busheling | 14.50 to 15.00 |
| No. 1 machine cast | 18.75 to 19.25 |
| Iron axles | 26.00 to 26.50 |
| Axle turnings | 13.50 to 14.50 |
| Wrought turnings (free from cast) | 12.50 to 13.00 |
| Grate bars | 15.00 to 15.50 |
| Pipes and flues | 14.00 to 15.00 |
| Tank iron | 12.50 to 13.50 |
| Hoop and band iron | 8.50 to 9.00 |
| Sheet iron | 7.50 to 8.50 |
| Wrought drillings | 12.50 to 13.50 |
| Stove plate | 15.00 to 15.50 |
| Cast borings | 10.75 to 11.25 |

## BRITISH IRON MARKET.

### Cleveland Prices the Highest in Seven Years.—Temporary Reaction.

Office THE IRON TRADE REVIEW, Prince's Chambers, Corporation St., Birmingham, Eng., May 22.

High prices have ruled throughout the past week, and the latest advices show that Cleveland iron is selling at 61s 1½d. ($14.95). There was a slight reaction yesterday, resulting in a fall of 8½d on the day, but this is manifestly temporary

and all the tendencies are in the direction of still higher prices. A few days ago, pig iron touched the remarkable figure of 62s 8d. ($15.34.) The holidays have had a slight influence this week, forges and foundries of course being at a standstill, with the result that there has been less pig-iron consumed. But the demand is still very great and one well-informed dealer on the Birmingham Exchange on Thursday confidently predicted a rise of 10s before maximum figures are reached. The high prices seem to have frightened off Belgian and French buyers, but large cargoes are still being arranged for America and Germany. The latest reports of Middlesboro stocks show a total of 356,923 tons. This is less than half the amount held a year ago, so that if the demand still continues the lot will be wiped out within the next twelve months. The shipments this month have been about 6,000 tons per working day. Recent Cleveland prices are the best realized since 1900.

# METAL MARKET.

## NEW YORK.

June 4.

**Copper.**—The market continues its weakening tendency, with only a small volume of current business. In some instances selling interests have made lower quotations without stimulating activity on the part of consumers. For early shipment and for heavy tonnages the market changes are still unimportant, but for futures considerable shading is reported. May exports were considerably heavier than anticipated, the total from Atlantic ports being slightly more than 9,000 tons, still an exceedingly low figure. May imports were some 500 tons greater. We quote as follows: Lake, 24½c to 25¼c; electrolytic, 23c to 24c; casting, 22¼c to 23c. The London market is much lower, yesterday's close being £98 5s for spot and £95 for futures.

**Pig Tin.**—Another bad break in the foreign market, coupled with better deliveries in this country due to improved conditions in the longshoremen's strike, has sent prices somewhat lower and has rendered the situation noticeably easier. We quote for spot 41½c to 42c, for June and July delivery, 40½c to 41½c. London closed yesterday at £187 for spot and £183 10s for futures.

**Pig Lead.**—Though the foreign market continues strong, an easier situation prevails so far as domestic business is concerned. We quote New York at 5.90c for spot, with Missouri at 5.85c. Soft Spanish closed yesterday in London at £20.

**Spelter.**—Refined in carload lots for spot and June delivery is quotable at 6.50c. London closed yesterday at £24 15s for G. M. B.

**Antimony.**—The market is much lower, with quotations as follows: Cookson's, 20c; Hallett's, 17c to 17½c; ordinary brands, 16½c to 17c.

## CHICAGO.

June 3.

No heavy purchases of metal were reported on the local market during the week. Large buyers bought in small quantities for current needs as for the past month. The only change in prices was a fall of one cent in the price of copper casting.

Copper lake continued to sell for 26c, but casting dropped to 24½c and 25c. Sheet zinc was quoted at 8.60 La Salle in car lots of 100-pound casks. Spelter sold at 7¼c. Pig tin varied between 45½c and 45¾c. Lead desilverized was quoted at 6.50c and 6.60c in 50-ton lots and corroding between 7.25c and 7.35c. The price in car lots was 2½c per 100 pounds higher. Cookson's antimony sold for 25c and 25½c and other grades at 24c.

Inactivity characterized also the second-hand market. Few large sales were reported. Few changes in price resulted and those of slight importance. Prices quoted were:

Copper wire, 19.50c; heavy copper, 19c to 19.50c; copper bottoms, 17.25c to 18.50c; copper clips, 18.50c to 19.50c; red brass, heavy, 17.50c to 18.25c; yellow brass, heavy, 15c; red brass, borings, 15c to 16c; yellow brass, borings, 13c to 13.25c; light brass, 11c to 11.50c; zinc, 4.75c to 5c; pipe lead, 5.40c; tea lead, 4.75c to 5.15c; tin foil, 31 to 34c; pewter No. 1, 27 to 28c.

## ST. LOUIS.

June 3.

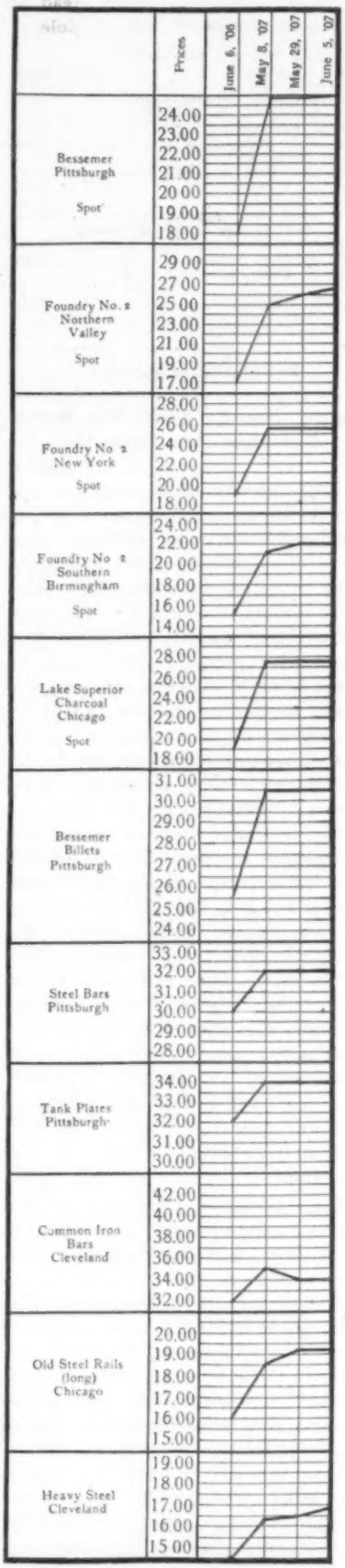
Owing to the more active competition among the smelting companies that have been practically out of the market for two months, lead ore at Joplin advanced generally $1 per ton, with the high price 50 cents per ton higher.

Zinc prices were generally stronger early in the week, but the demand subsided toward the close, when it became evident that the production reduced by the floods of May 13 had resumed a normal condition by the starting of a number of new mills. The output and shipment of the week were approximately balanced.

The highest price paid for lead was $83.50, and for zinc $51 per ton, as against $82 for lead and $45 for zinc per ton a year ago.

The shipment was an increase of 1,517,180 pounds of zinc, and 863,400 pounds of lead, at an increase of $93,512 in value, as compared with the corresponding week of last year.

**PRICE CHART.**



## LARGE INCREASE

### In May Shipments From Head of Lakes.—Reception on the Cole.

Office of THE IRON TRADE REVIEW,
411 Providence Bldg.,
Duluth, June 1.

If there has been any doubt up to this time regarding the rate at which ore is being moved from the head of the lakes it must surely cease with a glance at the figures for the month of May. The Missabe docks made two records in handling during the month: 1,835,921 tons of ore, or 695,160 tons more than in May, 1906, and 34,825 tons more than the best previous record made last July. The second record was in the unloading of 2,546 cars in 24 hours. It will be gratifying also to the large number of independent interests shipping from Allouez to note that the Great Northern railroad has more than made good its proposed increase of 50 per cent in tonnage handled during May. The shipment from Superior was 994,504 tons as compared with 657,924 tons in May, 1906, an actual increase of a little more than 51 per cent. If the boats which have been the cause of delays up to this time arrive in good season at Allouez from now on, the Great Northern will undoubtedly ship its full quota.

The Two Harbor docks also showed an increase for the month with 1,208,428 tons this year against 1,011,430 tons in May last year. This aggregates a shipment of 4,038,853 tons from the head of the lakes during May, an increase of 1,228,738 tons over last year. The total for the year is 4,487,750 tons, so that at the end of May the shipments are about as far ahead of last year as they were behind at the beginning of the month or 693,021 tons. With the new boats available this month, the June tonnage bids fair to make another record. During the fore part of the coming week, cargoes will probably be smaller, as 18 feet 10 inches has been ordered as a maximum draught for the Soo river.

The Thos. F. Cole, the latest steamer to be added to the Pittsburg Steamship Co. fleet, arrived in Duluth from the ship yard at Detroit on Memorial day. The unusual courtesy was extended to the citizens of Duluth of making themselves at home on board and the best part of the day was given up to the reception. The occasion was at the same time a noteworthy evidence of the liberal, inclusive spirit actuating the business policy of the Steel Corporation, an acknowledgement on the part of the people that the corporation merits the public endorsement and a personal tribute to the president of the Oliver Iron Mining Co., in whose honor the boat was named. In departing for Lake Erie the Cole took the largest load of ore this year and within 368 tons of the Lake Superior record. This was done on a draught of 19 feet 3 inches forward and 19 feet 7 inches aft as compared with 19 feet 10 inches on the record cargo. The cargo was 11,500 tons.

It has been reported that the Great Northern railroad will build a new dock at Allouez, but beyond the fact that the railroad already owns the necessary property and may possibly build a dock for use in 1909, there is no truth in the story. The new transfer yards will not be ready for two or three months, it is now thought.

At the Sellers mine in April a splendid record was made in stripping, when with three shovels 180,000 yards were removed.

## FOREIGN PIG IRON IMPORTS ON THE INCREASE.

Increasing tonnages of foreign pig iron are being used in American mills and foundries at the present time, according to the monthly summary for April of imports and exports announced by the department of commerce and labor. During the month of April, 1907, there was received 61,304 tons dutiable of foreign pig iron, compared with 55,692 tons dutiable in March, 1907, and 22,735 tons dutiable in April, 1906. For the 10 months ending April, 1907, the pig iron imports amounted to 453,685 tons, compared with 220,036 tons for the corresponding period in 1906 and 81,021 tons in 1905.

**Crude Steel Imports.**—A falling off of crude steel imports in the month is shown. In April, 1907, the total was 926 gross tons, compared with 1,207 gross tons in March, 1907, and 1,308 gross tons in April, 1906. In the 10 months' period ending April, 1907, the crude steel imports aggregated 16,155 gross tons, compared with 15,774 gross tons in the same period in 1906 and 7,707 gross tons in 1905.

**Iron Ore Imports.**—Corresponding with the increase in pig iron, iron ore imports show substantial gain. Of ore there was received 137,605 tons dutiable in April, 1907, against 75,997 tons dutiable in March, 1907, and 81,646 tons in April, 1906. The total for the 10 months' period ending April, 1907, was 889,943 tons dutiable, compared with 771,192 tons dutiable in the 10 months ending April, 1906, and 592,349 tons dutiable in 1905.

**Steel Rail Exports.**—Foreign countries in April, 1907, used 40,012 tons of American steel rails, as compared with 25,384 tons in March, 1907, and 24,862 tons in April, 1906. The 10 months' total in the period up to April, 1907, however, shows a decrease. The figures for the same length of time in three years were 260,957 in 1907, 282,041 in 1906 and 372,380 in 1905.

**Sheet and Plate Exports.**—The exports of iron sheets and plates for April, 1907, were 4,234 gross tons, against 2,736 gross tons in March, 1907, and 775 gross tons in April, 1906. The total figures in iron sheets and plates for the 10 months ending April, 1907, were 24,234 gross tons, compared with 8,006 gross tons in 1906 and 3,874 gross tons in 1905. In steel sheets and plates and shipments of American products in April, 1907, were 9,825 gross tons, against 9,172 gross tons in March, 1907, and 11,389 gross tons in April, 1906. For the 10 months ending April, 1907, the steel sheets and plates exported totaled 81,701 gross tons, corresponding with 62,713 gross tons the same period in 1906, and 56,767 gross tons in April, 1905.

## EMPLOYES' DEMANDS

### Will be Ignored by the Blast Furnace Operators.

At a recent informal meeting of valley pig iron producers, it was decided to entirely ignore the demand for increased pay and shorter hours for all blast furnace employes presented by the International Association of Blast Furnace Workers and Smelters of America, through James McMahon, of Youngstown, O., signing himself as president. The employers are satisfied that no trouble in suspensions of operations will result from this action. The notice from the labor organization states that on and after July 1 eight hours shall constitute a day's work for all men now working 12 hours around the furnace and that the following rate of wages shall apply: Keepers advance from $2.90 to $3.00, helpers advance from $2.30 to $2.50, fillers advance from $2.30 to $2.50, laborers advance from $1.65 to $1.75 and all other help in proportion.

Blast furnace workers, aside from laborers, have been working 12 hours and the new demand for an eight-hour day, making a third shift necessary at all furnace plants, would increase the production cost 62½ per cent and affect 36 furnaces in the two valleys.

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## WORLD WIDE ACTIVITY IN IRON AND STEEL PRODUCTION.

No country hitherto considered even a modest producer of iron and steel has failed to make important progress in the past two years, with the exception of Russia, and no one who has given even the most cursory study to the troubles in that empire will deny that its having in late years closely approximated the production of a few years ago is the exception which tests the rule that the iron and steel activity is world wide. Pig iron production in 1906 was approximately as follows, in gross tons:

| | |
|---|---|
| United States | 25,300,000 |
| Germany | 12,300,000 |
| Great Britain | 10,100,000 |
| France | 3,300,000 |
| Belgium | 1,400,000 |
| Sweden | 600,000 |
| Canada | 500,000 |
| Other countries | 5,500,000 |
| | 59,000,000 |
| In 1905 | 53,700,000 |
| In 1904 | 45,000,000 |
| In 1903 | 45,700,000 |
| In 1902 | 43,400,000 |
| In 1901 | 40,200,000 |
| In 1900 | 40,200,000 |
| In 1890 | 27,000,000 |

The world's production doubled from 1890 to 1905, and then in a single year showed a further gain of about 10 per cent. These figures are far from telling all the story. The production of steel has increased much more rapidly than has the production of pig iron, and in turn the degree of finish given to the steel before it has been put into consumption has increased. While the production of no line has fallen behind, the production of the lighter lines, such as pipe and sheet and wire products, has increased more rapidly than has total production.

A few years ago the opinion was quite prevalent outside of Great Britain, and was shared by not a few British ironmasters, that the iron trade of that country, if not already decadent, had at least the seeds of decay implanted. The recent past has demonstrated the utter fallacy of the conclusion. Great Britain has broken her records of production, and has placed her iron trade upon a sounder footing than ever before. Profits have been made, and are ready to be invested in improvements. Germany has come to the front, and the processes of manufacture and distribution have been worked out with the well known German thoroughness. The Russian iron manufacturing industry has displayed such vitality that while imports have decreased, through lack of demand on account of the domestic turmoil, exports have been increased. The United States has made its usual spectacular showing, having increased its domestic consumption enormously, and increased its exports as well. Belgium and France have done well, and other countries, such as Italy, Japan, and China, are being heard from.

Undoubtedly production will some day overreach itself. These rapid increases cannot continue indefinitely, but a scrutiny of the actual conditions in all these countries is convincing that the foundation is more substantial than it has ever been before; in consequence, the inevitable reaction can be met better than ever before.

The increase in production has been more rapid in the United States than in other countries, and it is perhaps only natural that the expectation should be entertained that this country should furnish a good share of the trouble, when the reaction comes. That fear is certainly entertained abroad, as remarked in these columns last week. It can be said, however, that the American iron industry has never before expanded in so solid a manner. The leading interest, the United States Steel Corporation, has put its plants in good shape, and has accumulated large funds, not in the form of book surpluses, but in actual reserves. Other large interests have been most conservative in their expansion, compared with the mushroom growths with which previous boom periods have been sprinkled, and, finally, the small interests are on a more substantial foundation than they have ever been on before. Many of them, perhaps the bulk of them, actually feel that they are suffering now from an overdose of prosperity, and not a few would welcome a reduction in the pressure. These interests quite largely believe that they have felt the prosperity more in the purchasing than in the selling departments.

No one need welcome a reaction, but it is a comforting thought that the United States, and the iron industry of the world, are better prepared for any reaction that may possibly come, than has ever been the case in a like period in the past.

## THE SMALL PROPORTION OF RAILROAD CASUALTIES DUE TO DEFECTIVE RAILS.

The public discussion regarding the quality of steel rails is likely to magnify the importance of defective rails as a contributor to railroad casualties. In many articles, one observes a laxity whereby the facts of the occurence of so many railroad accidents, and the discovery of a good many broken rails, are taken together, permitting the mental attitude that the two are closely related. The actual facts are not closely related. Only a very small proportion of the railroad casualties are really attributable to defective rails. The data collected by the Interstate Commerce Commission fully prove this statement, and these facts should be accorded closer study by the public than has been given them.

Certainly one single casualty a year, due to a defective rail, should be sufficient to direct attention to the subject of rail quality, but railroad managers are only human; they have a monumental task before them, to reduce the terrible list of fatalities, and public opinion should not force them to take up the details out of their natural order. Nor should railroad managers play upon the excitability of the public and throw an undue amount of blame for accidents upon the rail makers.

*Ex parte* statements of the number of rail failures observed are misleading as to the fatalities produced by this cause. Accident Bulletin No. 22 of the Interstate Commerce Commission has just appeared, covering October, November and December, 1906. While these statistics do not attempt to give the exact cause of each derailment, they do give certain statistics which must be taken at par. If the total loss of life due to derailments constitutes a small proportion of the loss of life due to all causes, then something is proved, and when the derailments due to defects of roadway are segregated, and shown to be a small proportion of the total derailments, something more is proved. The proportion due to defective rails is some quantity still smaller. The following table compiled from the commission's reports illustrates the smallness of the proportion:

LIVES LOST THROUGH COLLISIONS AND DERAILMENTS.

| | Fiscal years 1905. | July Aug. Sept. 1906. | Oct. Nov. Dec. 1906. |
|---|---|---|---|
| Derailments due to defects of roadway, etc. | 50 | 38 | 14 | 8 |
| Other causes | 406 | 335 | 91 | 138 |
| All derailments | 456 | 373 | 105 | 146 |
| All collisions | 608 | 604 | 142 | 308 |
| All derailments and collisions | 1064 | 977 | 247 | 454 |

The number of derailments due to defective rails is doubtless but a small proportion of the total number of derailments due to defects of roadway. There is an endless category of such defects. Defective rails would occupy a relatively minor place on such a list, could it be compiled with reference to results produced in loss of life. Still, it is instructive to observe that in the fourth quarter of 1906 only eight lives were lost through derailments due to defective roadway, out of a total of 146 lives lost through derailments, and a total of 454 lives lost through collisions and derailments together, less than 2 per cent of the total. In the third quarter of 1907, the proportion was less than 6 per cent, and in the two fiscal years, 1905 and 1906, it was only a trifle over 4 per cent. The total loss of life due to defective rails is probably not one per cent of the loss of life due to all derailments and collisions. Certainly it is well to look to the one, but the ninety and nine should not be neglected, and where the human element with all its limitations is in the final analysis the controlling influence, too much attention must not be given to one point.

The commission has made a practice in its quarterly accident reports of giving details of a number of the most prominent accidents occurring during the quarter. The report for July, August and September, 1906, catalogs 45 prominent train accidents, of which 33 are collisions and 12 derailments. These 45 accidents killed 91 persons. Less than a fourth of these prominent accidents were derailments, and of the derailments not a single one is attributed to defective rails. About half the derailments were attributable to negligence of operatives. One alone, it may be remarked, was held to be due to excessive speed.

The report for October, November and December, 1906, gives details of 40 prominent train accidents, causing the loss of 204 lives. Of these 30 were collisions, killing 144 persons, and 10 derailments, killing 60 persons. Of these 10, three were unexplained, while one only was directly attributed to a defective rail, and it is noted that the rail had an excess of phosphorus and manganese.

These reports for the latter six months of 1906 attribute but one accident to a defective rail, which accident did not result in any loss of life. There is every reason to assume, therefore, that of the quite large loss of life due to the operation of railroads in the United States, accidents by reason of defective rails must occupy a very minor position. Without question the subject of rail quality is an important one, but it should not be viewed out of its proper bearing.

## MAY ORE SHIPMENTS.

The ore shipments for May make a total of 5,621,285 tons, a gain of 1,316,331 over May, 1906. The shipments to June 1 are 6,252,261, a gain of 499,921 tons over the same period of 1906. The shipments by ports were as follows:

| | May 1906. | May 1907. |
|---|---|---|
| Escanaba | 680,490 | 722,516 |
| Marquette | 319,171 | 366,826 |
| Ashland | 497,760 | 479,924 |
| Superior | 657,924 | 994,504 |
| Duluth | 1,140,761 | 1,835,921 |
| Two Harbors | 1,008,838 | 1,221,594 |
| | 4,304,954 | 5,621,285 |
| | To June 1, 1906. | To June 1, 1907. |
| Escanaba | 923,744 | 1,014,339 |
| Marquette | 404,397 | 376,873 |
| Ashland | 632,062 | 495,194 |
| Superior | 868,187 | 1,101,183 |
| Duluth | 1,524,404 | 1,937,830 |
| Two Harbors | 1,399,546 | 1,326,842 |
| | 5,752,340 | 6,252,261 |

**Wilpen is Launched.**—The bulk freighter Wilpen was launched at the Ecorse yard of the Great Lakes Engineering Works on June 1 for the Shenango Steamship Co., and was christened by Miss Mary Black Snyder, daughter of Wm. P. Snyder of Pittsburg. This unusual name is compounded from Mr. Snyder's full name, which is William Penn Snyder, and the ship is named in honor of his country place near Pittsburg. The Wilpen is 574 feet over all, 554 foot keel, 58 foot beam and 32 feet deep. She is intended to be the flagship of the fleet that the interests associated with Mr. Snyder are now putting on the lakes. She is a well constructed vessel, being of unusual strength. The plates used in her construction are thicker than those ordinarily found in a lake freighter. Among the guests were Mr. and Mrs. W. P. Snyder, Miss Mary B. Snyder, Miss Lucy Kay, Miss Bessie Woods, Miss Mary Coder and Messrs. C. C. Burguine, John Capan and Hamilton Harlow of Pittsburg.

**Annual Red Manual Issued.**—The twenty-ninth annual edition of the Red Manual of Statistics and stock exchange hand-book for the year 1907, which has just been issued, has been received by THE IRON TRADE REVIEW with the compliments of Otis & Hough, brokers, Cuyahoga building, Cleveland. The work contains its usual valuable information relative to railroad, industrial and government securities, stock exchange quotations, bank and trust companies and other interesting data brought strictly up-to-date.

## HEAVY INQUIRY

### For Machine Tools, But New Business During May in the East Not So Large.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., June 3.

While the volume of new business coming out during the past week has not been extremely large, machinery manufacturers and dealers state that this is due chiefly to the absence of heavy lists for railway work and plant equipment. Lighter demand is noted in the larger and special tools, such as punches and heavy shearing machines, but activity in the standard lines continues unchanged, with moderate purchases by several important manufacturing interests. Compared with the early months of the year, the larger machinery houses report May has been less productive of business, though bringing out a volume of inquiry which in ordinary times would be considered extremely good. As a result, deliveries have improved greatly in certain lines, but manufacturing interests are still so plentifully supplied with orders that the effect of this moderate recession will not be felt for months. In a number of instances selling concerns report business as heavy as a year ago, and are unable to see any signs of a lull, so far as their own trade is concerned, but this can usually be explained by unusual conditions prevailing.

With the exception that the Seaboard Air line is in the market for a miscellaneous line of tools for replacement purposes, no large railway list has come out since the Norfolk & Western last week sent out specifications for additional equipment for its Roanoke, Va., shops. The New York Central is buying moderately all the time and the New York, New Haven & Hartford has not yet completely filled the large list sent out months ago, but it is considered unlikely that these requirements will be placed in the near future. Excellent business is reported in pneumatic tools. A local house combining the equipment of street railways and lighting plants reports that business in the former line has been extremely light for some time, but in electric lighting equipment there is marked activity, a feature being the large number of industrial establishments now installing their own lighting systems.

F. D. Mitchell, secretary of the American Supply and Machinery Manufacturers' Association, 309 Broadway, New York, has issued a new list of the membership of that association, revised to June 1. This shows a total membership of 138, indicating that the growth of the organization during the past year has been extremely active. In connection with the recent joint convention at Cincinnati, 22 concerns were added to the rolls, as follows: American Belting Co., Youngstown, O.; American Valve & Meter Co., Cincinnati; Baeder, Adamson & Co., Philadelphia; Chandler & Taylor Co., Indianapolis; Cincinnati Tool Co., Cincinnati; Eagle Belting Co., Cincinnati; Stanley G. Flagg & Co., Philadelphia; E. F. Houghton & Co., Philadelphia; Jewell Belting Co., Philadelphia; Kalamazoo Railway Supply Co., Kalamazoo, Mich.; Jas. H. Link Mchy. Co., Williamsport, Pa.; Manufacturers' Belt Hook Co., Chicago; Mechanical Rubber Co., Cleveland; Norristown Magnesia & Asbestos Co., Norristown, Pa.; Oliver Mchy. Co., Grand Rapids, Mich.; Charles Parker Co., Meriden, Conn.; Pittsburg Steam Packing Co., Pittsburg; Schaeffer & Budenberg Mfg. Co., New York; Simonds Mfg. Co., Fitchburg, Mass.; Stephenson Mfg. Co., Albany, N. Y.; Warren Mica Lubricant Co., Warren, Pa.; Wilson Saw & Mfg. Co., Port Huron, Mich.

An attendance of about 600 is expected at the joint convention of the Southern Hardware Jobbers' Association and the American Hardware Manufacturers' Association to be held at Richmond, Va., June 11-13. Headquarters will be at the Hotel Jefferson and at the conclusion of the sessions on June 14 a junketing trip will be taken down the river to the Jamestown exposition. Both associations have enjoyed a prosperous growth since their joint meeting at Virginia Hot Springs a year ago.

Negotiations are nearing completion by which the affairs of the Hartford Foundry Corporation, Hartford, Conn., are to be re-organized and the plant taken over by a new company, by which it will be operated. The corporation failed about a year ago and Charles E. Dustin, of Charles E. Dustin & Co., 11 Broadway, New York, was made receiver. Under his charge the foundry has been run on an extremely profitable basis and creditors will be paid in full. The plant does jobbing work and employs about 200 men.

The Boston Consolidated Gas Co., which is equipping a new gas plant at Everett, Mass., with a daily capacity of 10,000,000 cubic feet, has placed an order with the Connersville Blower Co., through its eastern sales agent, Horace G. Cooke, 95 Liberty street, New York, for three blowers for the generators and three gas exhausters, all complete with engines.

Samuel W. Traylor, president of the Traylor Engineering Co., 2 Rector street, New York, has left for the west, where he will spend about thirty days in engineering work in Colorado, New Mexico, Arizona and Mexico. This company is now doing considerable work in installing separator plants in connection with iron ore mines, having recently built a 600-ton magnetic separator for the Salisbury Steel & Iron Co.

Denial is made of the report that the Standard Steel Works, Burnham, Pa., will be sold or removed from that location. The works are owned by the Baldwin Locomotive Works, and the report has been current that they were to be removed to Latrobe, Pa.

A. E. Mitchell, heretofore superintendent of motive power for the Lehigh Valley, has been made purchasing manager for the New York, New Haven & Hartford and the Central New England Railways.

## COLORADO FUEL & IRON CO. OPERATIONS.

(Special Correspondence.)

Pueblo, Colo., June 2.—With the idea of effecting a large saving, should the experiment prove a success, the new merchant mills at the Minnequa plant are being equipped with coal burning heaters for all billets that enter the machinery. Gas is used for this purpose throughout the plant, but that method has not given satisfaction and it is thought that coal burning hot beds will be more efficient. It is the intention of the management to give the new department a test run this week, and all the machinery now in place will be given a thorough try-out and the engines gotten into working order, although it is doubtful if the plant proper can be placed in operation before the end of the coming month. In the past, every department in the plant has been equipped with gas producers for the purpose of supplying the material for heating the billets, but should the experiment turn out in the way that it is hoped, they will be removed and supplanted with large coal bins.

The present week will see the blowing in of two of the largest furnaces in the Minnequa plant, and when that is accomplished every one of the big stacks will be working at the same time, making a scarcity of pig iron practically an impossibility. One of the furnaces has been down but a short time, and was partly relined, while the other has been repaired throughout and has been out of commission nearly three months.

Twenty cars of steel rails from the Minnequa plant stand on sidings in the vicinity of Canon City, Colo., and will be used in double tracking the Denver & Rio Grande from that city to Florence. The rails are of the 85-pound variety and appear to be of the first class. The entire new line is to be built of steel from this plant and the rail mill has been working on the order for several weeks.

## TRADE SCHOOL

### May Be Established in Cincinnati.—Quarterly Meeting of Metal Trades Association.

The regular quarterly meeting and dinner of the Cincinnati Branch of the National Metal Trades Association was held on the evening of May 31, at the Club House at Chester Park, a summer pleasure resort in that city. Si P. Egan, president of the Cincinnati Branch, opened the meeting and introduced J. C. Hobart, who acted as toastmaster. Mr. Hobart in a brief and fitting address presented to the members present the guest of the evening, W. W. Alexander, vice president of the General Electric Co., of Lynn, Mass. Mr. Alexander spoke on the subject of "Practical Trade Schools." His address was listened to with marked attention. The description of the apprenticeship school of the General Electric Co. plant was the basis of his remarks. Mr. Alexander said the apprenticeship school is divided into two departments, a machinery department and a pattern department. In the machinery department, about 10,000 square feet of floor space is devoted to the use of the school. There are in this department between 300 and 400 operatives in training. The instruction is systematic and the course is four years. As soon as an apprentice masters a machine, he is ready to instruct a new boy to take his place. He remains at the machine until the new boy is able to operate it, when he advances to another machine. Thus each apprentice as he masters a machine teaches his successor. The school is turning out now two graduates per week, and this number is expected to be increased in the near future to three or four.

The apprentices are paid at the rate of 9 cents per hour for the first year, 12 cents for the second year, 14 cents the third year, and 16½ cents, the fourth year. After the fourth year, they are regarded as craftsmen, or skilled mechanics. Most of the graduates stay with the company after finishing their course. Some stray, but as a rule the boys prefer to remain in the service of the company.

From an economic point of view, the school is virtually self-sustaining, as there is enough work that can be done by the apprentices to pay for the instruction. The company, says Mr. Alexander, employs about 11,000 men.

At the close of Mr. Alexander's address, Mr. Hargrave of the Cincinnati Tool Co., spoke on the subject of organizing a similar trade school in Cincinnati, and the suggestion was well received.

F. A. Geier, of the Cincinnati Milling Machine Co., said that in a certain sense this meeting was one of the most important ever held by the association, because of the importance of the subject and the light that had been brought upon the question from a practical standpoint. Mr. Geier offered the following resolution which was passed:

Resolved: That the president of this association be empowered to appoint a committee of five to investigate and report at a special meeting.

The meeting was one of the largest ever held by the local branch and there was much interest shown in the subject. Those present were:

#### Those in Attendance.

Wm. Lodge, Murray Shipley, R. D. Betts, L. B. Weber, Lodge & Shipley Mach. Tool Co.
H. T. Atkins, Atkins & Pearce Mfg. Co.
J. L. Shearer, Ohio Mechanics Institute.
F. B. Dyer, Supt. Cincinnati Schools.
J. C. Hobart, F. W. Felsberg, C. S. Reno, Triumph Electric Co.
S. P. Egan, L. R. Robinson, J. E. Hirst, J. A. Fay & Egan Co.
M. W. Alexander, General Electric Co., Lynn, Mass.
F. A. Geier, C. S. Gingrich, C. Wood Walter, C. W. Siehl, Geo. Dell, E. M. Chace, P. O. Geier, Cincinnati Milling Machine Co.
E. H. Hargrave, Henry Tschudi, Cincinnati Tool Co.
R. K. LeBlond, W. F. Groene, G. S. Pritchard, R. K. LeBlond Machine Tool Co.
H. H. Stoek, Mines & Minerals, Scranton, Pa.
F. M. Huschart, Wm. Peters, Wm. Bartels, H. M. Norris, L. G. Keck, Bickford Drill & Tool Co.
P. G. March, N. B. Chace, Cincinnati Shaper Co.
J. H. Day, J. H. Day Co.
J. J. Bruce, E. W. Amiss, J. J. Bruce Fdry. Co.
I. G. Johannigman, Oesterlein Machine Co.
Wm. Gilbert, Buckeye Fdry. Co.
B. B. Quillen, G. D. Walker, Chas. Meier, Geo. Langen, Cincinnati Planer Co.
C. H. M. Atkins, Warner Elev. Mfg. Co.
H. H. Haskin, Cincinnati Pattern Works.
J. B. Schroder, J. B. Schroder Co.
A. Messmer, A. Messmer Co.
Chas. F. Waltz, Employers' Association of Cincinnati.
Isidor Rath, Cincinnati Electrical Tool Co.
O. H. Broxterman, Ino. Steptoe Shaper Co.
J. V. Wright, National Metal Trades Association.
M. G. Rheinstrom, R. Rheinstrom, Rheinstrom Bros.
L. H. Mesker, Motch & Merryweather Co.
Wm. A. Greaves, H. H. Klusman, Greaves, Klusman & Co.
J. M. Manley, Geo. Burns, Cincinnati Metal Trades Association.
R. Mueller, Wm. Powell Co.
Fred. Ahrens, Chas. H. Fox, Ahrens Fire Engine Co.
H. Angebrandt Jr., Wm. Herman, Fosdick Machine Tool Co.
W. J. Thompson, Wm. Goodman, Laidlaw-Dunn-Gordon Co.
F. R. Lindsley, *The Iron Age.*
C. G. Ritter, Lane Thompson, H. Ritter, J. J. Ault, S. Moyer, Lunkenheimer Co.
F. S. Baldwin, W. H. Shafer, Cincinnati Machine Tool Co.
J. H. Renshaw, G. H. Houston, Houston-Stanwood-Gamble Co.
Henry Dreses, E. J. Spaeth, Dreses Machine Tool Co.
M. R. Conway, Conway & Co.
F. H. Bardes, L. Kruckemeyer Co.
L. C. Twachtman, Oakley, O.
Emil Von Wyck, Von Wyck Machine Tool Co.
Ino. W. Neil, John H. McGowan Co.
Wm. H. Muench, Lunkenheimer Co.
Jos. D. Morten, THE IRON TRADE REVIEW.

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The Big Four railroad is receiving its new freight equipment ordered some time ago, which included 250 flat cars, 1,000 steel gondolas, 250 self-clearing steel hopper cars of 100,000 pounds capacity and 250 Roger ballast cars of 100,000 pounds capacity.

## PERSONALS.

Supt. W. S. McCombs, of the Mary furnace of the Ohio Iron & Steel Co., Lowellville, O., was painfully injured recently by a heavy casting falling upon his foot.

Evans F. Jones has been appointed vice president and general manager of the Southern Steel Co., Birmingham, Ala. He was formerly with the International Harvester Co., Chicago.

A. L. Hammerburg, chief engineer of the Youngstown Sheet & Tube Co., Youngstown, has resigned, and will leave shortly for Sweden, where he will supervise the erection of a large rolling mill.

Frank W. Trabold has resigned his position with J. H. Williams & Co., manufacturers of drop forgings, Brooklyn, N. Y., to become general manager of the Cambria Forge Co., Johnstown, Pa.

E. A. Moore, president of the American Coke & Gas Construction Co., has been elected president of the Wilbraham-Green Blower Co., Philadelphia, to succeed J. S. Wilbraham, who has retired on account of poor health.

Henry C. Hunter, secretary of the New York and New Jersey branch of the National Metal Trades Association, sailed Wednesday, May 29, for a brief pleasure trip abroad. He is a passenger on the Teutonic and will return in about a month.

Stuart B. Marshall, formerly resident manager at Pittsburg for L. and R. Wister & Co., has been appointed assistant general manager of the Dunbar furnace and has moved to Dunbar, Pa. He is succeeded at Pittsburg by Horton Penrose.

Patrick M. Galvin, superintendent of the labor department of the Bessemer and Brown-Bonnell plants of the Republic Iron & Steel Co., at Youngstown, O., has tendered his resignation to take effect June 8, having accepted a similar position under Charles Hart at the Indiana Harbor works of the Inland Steel Co.

John R. Barclay has been appointed purchasing agent of the Ohio works of the Carnegie Steel Co. at Youngstown, O., succeeding C. S. Schofield, who recently resigned to accept a position with the Youngstown Sheet & Tube Co. A. C. Cook, formerly claim agent for the Ohio works only has had his jurisdiction extended over the upper and lower mills of the Union works, Youngstown.

## IRON WORKERS' STRIKE.

### At San Francisco is Settled by a Compromise.—Labor News.

(Special Telegram.)

San Francisco, June 5.—Through a compromise between the plant owners and the striking employes, a settlement in the machinists' and iron workers' strike, which has been paralyzing the industries of San Francisco in the past month, has been effected. All the men out will return to work at once at the former wage scale without the increase offered before the strike. It is agreed by the employers that the former nine-hour day shall be scaled to eight hours in three years. The men had demanded an eight-hour day with the same pay as for a nine-hour day. Over 10,000 men had been affected by the cessation of operations in numerous plants in San Francisco and vicinity and the industrial activity of the community had been seriously impaired.

#### Losses From the Strike.

San Francisco, May 25.—The first tangible evidence of the strength of the position occupied by the California Metal Trades Association is shown by the return to work of 30 machinists at the Standard Oil Co.'s refinery at Point Richmond, Oakland. Those men returned on the basis of a nine-hour work day, at the same scale of wages which was in force previous to the strike of May 1, which is taken as an indication of the general acceptance of the former basis by the various branches of the iron trades.

Thirty-five machinists who had been forced out by the action of their union have accepted work in the shops of the Southern Pacific Co.; on a ten-hour basis, and at a smaller wage than they formerly received for a nine-hour day.

The army of idle iron workers, forced into idleness by command of their unions, has been increased by men laid off within the past two weeks. Several plants declined to close shop May 1, when the plants of the California Metal Trades Association closed. Some had urgent work to complete, while others desired to test the eight-hour day results. Nearly all of those shops, with the exception of a few very small concerns, have closed since, and fully 2,000 mechanics and helpers have joined the army of unemployed in consequence. At a conservative estimate, 12,000 iron workers are idle in San Francisco at present.

A few hundred of the idle men have left town since the strike, and have gone elsewhere to find work. Those who have succeeded in obtaining work in other towns and cities have done so at a lower wage than they were willing to accept in San Francisco, and work longer hours than they were willing to work at home.

The Union Iron Works, the largest ship-building plant in San Francisco closed in consequence of the strike, is to remain closed indefinitely. The plant employed 3,900 men up to the day of the strike. Over 1,100 of the employes applied for work after the plant had closed, offering to work for the same wages and on the same conditions which prevailed before the strike, but there was no work for them, and they were told that the plant would be opened only when all departments shall be manned. C. M. Schwab, the owner of the Union Iron Works, told a friend of his in this city that he will keep the plant closed until such time that he shall be able to open with workmen of his own selection and upon terms and conditions he deems just and equitable to himself and to his employes.

The strike of the iron workers, though it affects many thousands directly and indirectly, is overshadowed by the street carmen's strike, the strike of the telephone operators and of the laundry workers, all of which subject the community to hardship and inconvenience. Owing to a number of strikes at one time, a crisis in the industrial and financial condition of San Francisco is hastened, and the solution of the entire problem is close at hand.

The street carmen's strike is losing ground each day. The public is growing tired of walking many miles mornings and evenings, or riding on break-bone buses at a snail rate, and paying five times the ordinary fare. The car companies are operating more cars each day and the patronage increases perceptibly.

In all this turmoil the strike of the iron trades sinks into insignificance, and the men will return gradually but unostentatiously. Meanwhile the wage earners lose about $500,000 of their earnings every week.

#### Erie Machinists Strike.

Because of the refusal of the Erie railroad to accede to the demands of the men and abolish the system of piece work, which was recently put into effect, a general strike of machinists has been declared against the road. The men on strike include employes at Susquehanna, Pa.; Dunmore, Pa.; Meadville, Pa.; Huntington, Ind.; Galion, O.; Youngstown, O.; Cleveland, and other places. The entire force of machinists in the employ of the Erie numbers about 3,000 men.

#### Cleveland Machinists Out.

Upon the refusal of the employers to grant their demands for a nine-hour day and a 10 per cent increase in wages, about 2,500 machinists working in plants in Cleveland and vicinity went on a strike June 3. Of this number about 1,300 are employed in the shops of members of the Metal Trades Association. The strike has been called by the machinists' union, but a number of non-union men have joined in the movement for a shorter day and more wages. In some plants, principally automobile shops, the brass workers have united with the machinists and have quit work, demanding a nine-hour day. The men have been working upon a 10-hour day basis.

#### Labor Notes.

A strike of union machinists on the Louisville & Nashville railroad has been called, the men demanding a wage schedule and working agreement in the shops of the entire system.

Two hundred machinists employed at the Franklin, Pa., plants of the Chicago Pneumatic Tool Co. and the Colburn Machine Co. have struck, demanding an increase of 5 per cent in wages, a reduction of time from 54 to 50 hours and a change of methods as to handymen and apprentices.

One hundred and seventy-five men struck recently at the Pope Mfg. Co., Westfield., Mass., declaring that an employe of the company was acting as a spy in the shop. It is said that this man was employed in the making of a parts catalog.

At the Dobbie Foundry & Machine Co., of Niagara Falls, N. Y., a few days ago, a business agent demanded a nine-hour day for the molders, and said that a strike would be called June 1. Mr. Dobbie refused the demands, but a strike was not called. At present there are many unemployed molders in Buffalo, many of whom are from other cities. Quite a few arrived there from Cleveland Monday.

About 250 molders and coremakers employed in the eight foundries at Dayton, Ohio, are on a strike demanding an increase in the minimum rates, a reduction in hours from ten to nine and an advance to all piece workers of 10 per cent with customary union conditions and restrictions. Twelve of the leading foundrymen of the city have become parties to an agreement pledging to conduct their plants as open shops, says the National Founders' Association. These plants include the Dayton Globe Iron Works Co., the Kramer Bros. Foundry Co., the Platt Iron Works Co., the Brownell Co., the Ohio Foundry Co., the Seybold Machine Co., the Joyce-Cridland Co., the Buckeye Iron & Brass Works, the New Era Gas Engine Co., the Advance Foundry Co., the Eureka Foundry Co., and the Davis Sewing Machine Co.

# THE MECHANICAL ENGINEERS AT INDIANAPOLIS.

## A MEETING OF UNUSUAL VALUE AND INTEREST.

### Superheated Steam and Automobile Steel the Principal Subjects Considered—Railway and Locomotive Practice Discussed—Other Papers.

With a registered attendance of about 300, the fifty-fifth meeting of the American Society of Mechanical Engineers was brought to a close in the Eliza Fowler hall of Purdue University at Lafayette, Ind., on May 31. The first sessions of the meeting, which began on May 28, were held in the palm room of the Claypool Hotel in Indianapolis. While somewhat small in point of numbers, the meeting was eminently successful, the papers being of a uniformly high quality and the discussions thereon of unusual interest. A noticeable fact in regard to these discussions was that those who took part in them were men eminently qualified to discuss the subjects under review, and with the result that much information was brought to light.

As briefly related in THE IRON TRADE REVIEW last week, the first session was called to order in the parlors of the Claypool at 8:30 Tuesday evening, where Mayor Bookwalter welcomed the society, paying tribute to the wonderful achievement of the engineering profession. President Hutton responded for the society, after which an informal reception was held, followed by a social reunion of the members and guests.

**Wednesday Morning's Session.**

The first business transacted was the report by the secretary of the adoption of two amendments to the constitution providing for the office of honorary secretary and for the establishment of a Research Committee. The president then called on Fred J. Miller for a report of the committee appointed to raise funds for wiping out the society's share of the indebtedness for the land on which the Engineering Societies Building in New York is erected. Mr. Miller stated that about $50,000 was yet to be raised and spoke of the means already adopted, and asked for suggestions.

A telegram of congratulations was received from the National Irrigation Congress, together with a request that a committee be appointed from the American Society of Mechanical Engineers to confer with the congress as to the best scientific methods for the carrying out of its work.

The committee on papers had arranged for a large number of papers on special subjects, chief among which were automobiles and superheated steam. Some of these were prepared by non-members of the society upon the invitation of the committee on papers, the authors being experts in their particular lines. These papers, however, were reserved for later sessions, and the first one taken up was the report of the Committee on Machine Screws. This committee, which has been in existence for about five years, has been engaged in the work of preparing standard specifications for machine screws. It has presented several reports to the society, but the discussion provoked by each report caused it to be referred back to the committee for further consideration. The revised report recommends a number of changes in the screw gage outside diameters, enabling the United States standard form of thread to be used without departing from the present pitch diameters which are large on the small screws and small on the large ones. Some little criticism was aroused by certain features of the report, but when it was explained by Mr. H. K. Jones that the present criticisms had all been made before, or that the points involved had been already carefully considered by the committee, it was moved and carried that the society accept the report and the committee be discharged from further consideration.

Prof. D. S. Jacobus next presented the preliminary report of the Committee on Refrigeration. This committee was appointed some time ago to consider and report on a standard basis for refrigeration. The present report is a continuation of its earlier work. The first report defined a standard set of conditions regarding the working pressures and recommended that what was termed the commercial tonnage capacity be based on the actual weight of refrigerating fluid evaporated in the refrigerator. The present report gives directions for conducting tests for determining the items specified in the first report and contained tables for recording the data. In presenting it, Prof. Jacobus explained that it was not conclusive, but was submitted with a view to bringing out discussion, as the committee expected that many alterations and corrections would be necessary. Prof. Shipman of Cornell University, in discussing the report, criticised the weighing device recommended, as it was large and clumsy and the tare was too large, thus requiring scales of unnecessary size. The valves as arranged in the apparatus may easily be subjected to large differences in pressure, thus introducing errors due to leakage. He suggested a somewhat different form of apparatus, a sketch of which was submitted.

The next paper taken up was by Prof. R. T. Stewart, and was entitled "Collapsing Pressures of Bessemer Steel Lap-welded Steel Tubes." This is printed in full on another page of this issue. The discussion evoked by this paper consisted mainly of questions by a few members regarding some points in the paper which were not exactly clear to them.

A. F. Nagle's paper on "The Balancing of Pumping Engines" followed Prof. Stewart's paper. This paper points out the manner of calculating the weight of the moving parts of a vertical triple-expansion single-acting plunger pumping engine. The object is to make all the loads alike on the up and down stroke completing the purpose frequently specified that the steam work shall be alike on each stroke. If this is done in the manner described, only a small part of the steam work has to be carried through the fly wheel, thus permitting this part of the machine to be much lighter than is commonly used.

**The Economy of the Long Kiln.**

The paper entitled "The Economy of the Long Kiln," by E. C. Soper, which was next read, was devoted to a discussion of the relative economy of kilns 7 feet diameter by 60 feet in length and 8 feet in diameter by 110 feet in length for burning Portland cement. The writer presents the results of some tests made on kilns of the two sizes mentioned above, burning natural gas, and finds that an increased fuel economy ranging from 25 per cent to 35 per cent is obtained by the use of the larger kiln. Byron Eldred, in discussing this paper, regretted that the tests had been made with gas instead of with pulverized coke,

which is the common fuel in localities where natural gas is not available. He took issue with the author as to the temperatures exising in the kiln at particular localities and stated that the heat was necessary only in a degree to fuse lime and silica. For the purpose of consideration the burning should be divided into two steps with dry material, namely, calcining and clinkering, and into three steps with wet material, drying, calcining and clinkering. W. D. Ennis spoke of the advantages of pulverized fuel and stated that the difficulties were principally with the preparation of this fuel rather than with the furnace in which it was burned. Only coal high in volatile matter could be used. Pulverized coal may be used in rolling mills, forges and works of similar character when it can properly be prepared with little labor. The danger with pulverized fuel was touched on, it having an action akin to gunpowder under certain conditions.

Prof. R. A. Carpenter criticised the paper rather sharply, stating that it was apt to be misleading for the reason that the conditions described in it are rather unusual; that the materials handled are usually dry and that little or no water is to be evaporated. If the results listed in the paper by the author are correct, they are unusually poor and do not even approximate the usual results with dry material obtained in the Lehigh valley. The usual consumption of a 60-foot kiln on dry process in that region is about 90 pounds of fuel to a barrel of cement. The figures presented by the author show extremely wasteful operation for a short kiln, and Prof. Carpenter stated that he knew of no plant in the Lehigh region which could afford to make cement on the coal consumption indicated in the paper.

**Wednesday Afternoon and Evening.**

Wednesday afternoon was devoted to inspection trips to a number of the local manufacturing plants in Indianapolis, including the Atlas Engine Works, the National Motor Vehicle Co., the Nordyke & Marmon Co., and the Parry Mfg. Co. These were the main points of interest, although a number of other concerns tendered the members of the society invitations to visit their plants. Among the manufacturers who did so may be mentioned the Chandler & Taylor Co., Adams & Raymond, the Diamond Chain & Mfg. Co., Pope Motor Car Co., Rockwood Mfg. Co., and a number of others. Concurrent with these excursions the ladies attending the meeting were taken in automobiles to the Indianapolis Country Club, where they were entertained by a local committee. On Wednesday morning the ladies were taken to the Eli Lilly Co.

The Wednesday evening session was devoted to an automoble symposium, the first paper being presented by Henry Hess and entitled "Ball Bearings." This paper gave the results of the last decade in the development of the ball bearing from a more or less discredited piece of mechanism considered suitable only for light work, to a reliable and valuable engineering device suitable under any and all journal conditions, whether of high speed and relatively light load, and slow speed and extremely heavy load; for shafts of a fraction of an inch diameter to those 40 inches diameter and larger. The fundamental work of Stribeck was abstracted by the author and a full translation of his researches appended to the paper. The various factors influencing ball bearing design as load, speed, shock, materials, workmanship, etc., are followed by a consideration of types of mounting and of size selection for a given duty. The paper related particularly to the use of ball bearings in automobiles and the reproductions of working drawings are confined to motor car mechanism. The broad discussion of principles of construction and application is, however, applicable to general engineering problems. The paper was read by Mr. Hess in abstract only, but he made extemporaneous remarks regarding a large number of drawings, photographs and diagrams, which were shown by stereopticon.

The paper was discussed by T. J. Fay, who stated that the material of the bearings was of more importance than the design. Mr. Fay has under way an investigation relating to the material, wear and life of bearings. He presented the composition of a number of bearings and stated that slight differences in chemical combination may give varying results in practice. Not only must the chemical composition be the same for the same result, but the finished product must be produced from identical raw material. The life of a bearing depended on numerous conditions of design, on the sizes used and on the mode of application. Tests conducted by him indicated that 20,000 car miles should be at least expected of a bearing.

The next paper was presented by John Wilkinson, Syracuse, entitled, "Air Cooling of Automobile Engines." In this paper the author discussed the internal conditions in the cylinder to obtain the best results, and also presented considerations in the design of the cylinder to obtain the most efficient operation. This paper caused no discussion and the meeting immediately passed to the consideration of the paper by Ellwood Haynes, on "Material for Automobiles."

**Steel for Automobiles.**

In this paper Mr. Haynes discussed the steels used in the early days of the machine, and recounted the difficulties and breakages encountered with carbon steel. He then described the use of nickel steel, first introduced into the automobile in 1899 and successfully used since that time by the company first employing it without a single breakage. Nickel steel was found to be practically free from crystallization and possessed an elastic limit of from 70,000 to 80,000 pounds, and a tensile strength of over 100,000 pounds with an elongation of from 15 to 20 per cent. It was first introduced in axles and then used in driving chains and gears. It proved unsuitable in the gearing, numerous breakages occurring. This trouble was remedied by using a steel which was an alloy of iron, nickel and chromium. This almost entirely obviated the breakage of gears, but nickel-chrome steel was so hard that it was difficult to machine, and it was not largely used until high speed tool steel was developed. A difficutly with the use of nickel-chrome steel is its tendency toward segregation, giving rise to hard and soft spots in the finished metal. It will not stand great variations of temperature without danger of injury, as it is sensitive to heat treatment, but when properly made and treated it has been found almost impossible to break a tooth from a 6-pitch gear, which renders it especially suitable for the manufacture of sliding gears which are subjected to destructive action due to the striking of teeth when forced into mesh while in motion. The author touched on the use of new vanadium steel, and also on the uses of bronze and aluminum. He presented a table showing the substances suitable for the various parts of the automobile, as follows:

For rear live axles, nickel steel containing 4 per cent to 5 per cent nickel and less than 0.3 per cent carbon.

For front axles, steering knuckles, propeller shafts, etc., vanadium steel.

For sliding gears, nickel chrome steel hardened throughout.

For crank shafts, nickel steel or vanadium steel.

For frames, low carbon open-hearth steel, mild nickel steel or nickel chrome steel.

For all other parts of the car, as hand levers, tubing, etc., open-hearth steel of comparatively low carbon, say 0.4 per cent or under.

The only person to discuss this paper was F. J. Neuman, who described the repair of fractured axles, and then stated that the proportion of pearlite, martensite, and ferrite are changed in forging. Mr. Neuman stated that he first altered the proportions of these constituents in the broken axles by appropriate heat treatment, and then repaired and reforged the axle. In regard to nickel steel, it has a tendency to laminate in rolling. Bronze as a material for automobiles is good, because it can be made into good castings for parts whose shape renders it impossible to forge in chromium or vanadium steels.

**Special Auto Steel.**

The scope of the paper, "Special Auto Steel," which was presented by Thomas J. Fay, embraces:

(a) Actual tests of the current products.

(b) Methods of arriving at the utility and hardness of the various products.

(c) The ranges of uses of the steel.

(d) Difficulty in fashioning the products, and special hints bearing upon the subject.

The results of the author's investigation were as follows:

*a.* Carbon steel for crank shafts, gears, axles, distance rods and springs, as well as some of the less responsible parts showed many failures in service.

*b.* Not a single part made of chrome nickel steel ever used by the author failed in service, although some of the chrome nickel steel used was not up to the standard of quality.

*c.* Puddle iron for mud guards, lamp brackets and like parts is a superior product. Moreover, carbon steel does not render so efficient service.

*d.* So-called puddle steel below 0.10 carbon as usually produced does not serve as a good substitute for the fine grades of iron mentioned above.

*e.* Die forgings of alloy steel make the use of alloy steel quite possible for even low-priced cars.

*f.* Designs must take into account the fact that alloy steel is to be used or the cost of machining will be excessive.

The author presented his conclusions as to the effect certain constituents had upon steel dealing with carbon, sulphur, phosphorus, silicon, manganese, nickel, chromium, vanadium, wolfram and copper. The paper was discussed by Elmer Neff, mainly by questioning the results and methods of Mr. Fay and calling attention to what he considered a number of errors in the paper. Some of these apparent errors were due to poor proofreading, but some questions showed a lack of understanding of the definitions of the terms used. Mr. Fay replied to the questions categorically and it seemed to be the opinion of the members that the honors were with him at the close of the discussion. Mr. Hess also contributed some replies to Mr. Neff and explained the difficulties encountered in machining vanadium steel for ball bearings. He found that he had to come to the use of the most simple and elementary lathe using an individual tool and to dispense with complicated tools. Mr. Hess stated that it was absolutely impossible to work vanadium steel with the tools commonly used on carbon steel, and some of the alloy steel. As the hour was extremely late at this point the reading of B. D. Gray's paper on "European Railway Motor Cars" was postponed until the next morning.

**Thursday Morning Session.**

B. D. Gray presented a paper entitled "European Motor Cars," which is a comprehensive resume of the present status of railway motor cars for light suburban service in European countries. The paper goes into detailed descriptions and presents drawings of the various motor cars developed on the railways of Great Britain, France, Belgium, Switzerland, Austria and Hungary. These cars are of the steam, petrol-electric, gasoline and gasoline-electric types. Exhaustive descriptions of the cars are presented, together with tables of operating costs. The use of this type of car is commended for frequent service on short runs, and in sparsely settled districts. This paper was somewhat widely discussed, Harrington Emerson criticising the combination of locomotive and coach from the standpoint of the repair shop. A locomotive can be repaired only in the shop and the taking of the coach into a shop suitable for locomotive repairs is apt to damage it. Mr. Emerson considered the use of gasoline out of the question for railroad use due to its high price, and recommended instead of the combined motor car a light type of locomotive burning fuel oil which could be attached to a coach. C. D. Young defended the position which the railroads of the United States had taken in regard to motor cars. The Pennsylvania Co. had experimented with a Vauclain steam car, which was entirely unsuccessful due to lack of steam capacity. The motor car could not be economically operated in this country on account of the laws of a number of states which require a full train crew of five men to be sent out with each train, single cars being considered as a train on steam roads. This would bring the labor cost so high that no possible economy in fuel could counterbalance it. The maintenance of frequent service is a necessity in the operation of motor cars. Most railroads in this country have not trackage enough to handle their freight properly and it would be absurd from an economical standpoint to hamper freight traffic for the maintenance of a more or less profitable passenger service.

President Hutton also touched on the point of the expense of gasoline, stating that the Pennsylvania railroad could use more than the entire supply of gasoline made in one year. Furthermore, gasoline is an extremely dangerous material to carry on an engine on the railroad, as the wreck of a train carrying gasoline would entail results more serious than attend wrecks even now. Prof. W. F. M. Goss stated that a coal-fired motor car is only fit for second-class service and that if a gasoline-fired car be used it becomes of limited power, and must be used in single units and not in trains. This would not present any material advantage in the cost of maintenance or operation compared with the individual locomotive and car.

**Superheated Steam.**

This session had been set aside for the consideration of superheated steam. A number of papers were on the list dealing with this subject, and President Hutton suggested that those nearly related be read and discussed together. Accordingly, the papers by A. R. Dodge on "The Specific Heat of Superheated Steam," by E. H. Foster on "The Flow of Superheated Steam in Pipes," by R. P. Bolton on "Furnace and Superheat Relations," and by A. M. Greene on "Determination of Entropy Lines for Superheated Steam," were presented either by the authors or the secretary.

Mr. Dodge's paper presents the results of two independent series of tests for determining the value of $c_p$ with pressure and with superheat at constant pressure are given. Each method is stated to be free from errors, due to inaccuracies in the total heat of steam given in the steam tables. One method involves the reduction of the temperature of superheated steam by injecting water; the second method makes use of the expansion of initially superheated steam in a throttling calorimeter. Each method indicates that c increases with increasing pressure, with no variation due to superheating at constant pressure. The results show a range of $c_p$ from a value of 0.48

at 15 pounds absolute to 0.666 at 600 pounds absolute irrespective of the superheat.

Mr. Foster's paper calls attention to the lack of existing information and the reasons why it is not easier to obtain data from existing power plants, chiefly because of unfavorable conditions as the arrangement of piping and the lack of uniformity of covering. Enough information has been collected, however, to draw general conclusions with reference to the rate of heat transfer, and to elucidate the law governing the loss of heat and pressure.

**Superheat and Furnace Relations.**

R. P. Bolton's paper criticises the existing practice of applying superheaters to boilers and states that by merely placing a superheater coil in a certain part of a gas passage of a boiler and connecting a steam supply to it is by no means to be regarded as a complete solution of the problem. The operation of an ordinary boiler furnace is subjected to so many variable elements in the nature of the fuel, its combustion, draft regulations, door openings, ash and clinker accumulations and the personal equation that an apparatus as sensitive as a superheater should be protected from these varying influences. The disappointments experienced in superheated steam operations of high temperature are due to these influences and fluctuations in the steam output of the boiler, which will also affect the degree of superheat. Furnace conditions should be such as to eliminate all fluctuations in the flow and temperature of gases, or the heater must be placed so that the flow of the gas volume can be controlled.

Mr. Green's paper describes the results of the experiments of Knoblauch and Jakob. The method of using the curve for the determination of the total heat required to superheat a pound of dry steam is explained which is followed by a simple graphic method of computing the entropy change from one temprature to another and by an approximate analytical method which gives close results, which are then plotted on a temperature-entropy diagram, on which the lines of the total heat are also plotted.

Sydney A. Reeve discussed Mr. Dodge's paper, stating that in the first method described he (Mr. Reeve), could not obtain the same results by computing from the data given by Mr. Dodge. He could not agree with Mr. Dodge's conclusions that the temperature has an inappreciable effect on the value of $c_p$, although he notes marked increases in value with increasing pressure. The conditions of the reported experiments were poorly chosen to show any such variation, if it should exist. There are but few experiments showing the effect of differing temperature conditions under constant pressure. Such as there are show an increase of $c_p$ with temperature.

Prof. Carpenter also discussed Mr. Dodge's paper, stating that the absolute values of the specific heat of superheated steam as obtained by numerous observers nearly always were considerably higher than those indicated by Mr. Dodge. The great difficulty of determining the specific heat of superheated steam is due to the fact that the quantity to be determined is small and is but a small percentage of the total heat to be measured. There are also instrumental corrections almost if not quite as great as the quantity to be measured, that is, there may be an error of 100 per cent in all readings. Prof. Carpenter gave the history of the work done by the various experimenters extending over the past ten years. In a number of instances the experimenters had reported an increase of specific heat with increasing temperature. Investigations of experiments in which such results were obtained will usually show that the degree of superheat was small and the increase of temperature taking place was principally due to change of pressure.

H. P. Dirks in discussing Mr. Dodge's paper commended the work of Knoblauch and Jakob and called attention to the careful method used by them. He described the apparatus used by these experimenters which consisted of a double superheater using electrical apparatus for superheating. These men found that they could not obtain a uniform degree of superheat and constructed their superheater accordingly. They also found that superheated steam could exist in the same pipe with moisture.

Max Toltz in discussing Mr. Foster's paper, described some experiments made by him on 800 feet of two-inch steam pipe with superheated steam at 90 pounds pressure. With a velocity of 100 feet per second, the loss of temperature per hundred feet was between six and seven degrees; with a velocity of 50 feet per second, the superheating was lost entirely. In a certain passenger locomotive running at a speed of 55 miles per hour, the steam attained a velocity of 234 feet per second and ten degrees of superheat were lost, while with a velocity of less than 150 feet per second, the loss was from 12 to 30 degrees.

Frank Koester, in discussing Mr. Foster's paper, said that it could be made more complete by adding a chart showing the volume of superheated steam at various pressures and temperatures. He presented the Zeuner formula used by Herr Berner before the Verein Deutsche Ingenieure by which he calculated the volume of superheated steam. From the formula a chart had been constructed showing the volume of superheated steam of various degrees of superheat.

Frank C. Wagner criticized Mr. Dodge's paper making a comparison of results obtained by him with those obtained by other experimenters. It is unfortunate that after so much time and effort has been extended on the problem that the results obtained by Mr. Dodge are erratic. In respect to the first method used, that of injecting water, Mr. Dodge deduces the conclusion that specific heat does not vary with temperature but does with pressure. Yet the table presented shows wide variations of this law. Mr. Wagner also made a criticism previously brought out by Prof. Reeve in relation to the constancy of specific heat at an indicated temperature, and stated that the only case in which the statement of Mr. Dodge can be true is when the heat quantities are proportionate to the increase of temperaure of atmospheric pressure. This does not agree with the conclusions of Knoblauch and Jakob, who found that specific heat at atmospheric pressure varies from 0.46 at a temperature of 100 degrees Cent. to 0.511 at 400 degrees Cent. He agreed with Mr. Dodge that the specific heat of superheated steam increased with pressure, but did not think that Mr. Dodge had proved his case that it does not vary with temperature.

Dr. D. S. Jacobus concurred with Mr. Wagner in regard to Mr Dodge's paper. He stated that the entire trouble in experiments on superheated steam was that it was impossible to eliminate the film of moisture which runs along the inside of a pipe. In regard to Mr. Foster's paper, Hosea Webster presented Berner's conclusions from observations on superheated steam made in 1904, viz., "that while much information is available as to the generation of superheated steam, and as to its action in the engine, we are still with regard to its exact behavior during transmission practically groping in the dark." Berner's observations and those of others show that pipes conveying superheated steam also convey more or less water of condensation. The fact that superheated steam pipes con-

vey water of condensation raises the question as to whether the temperature of the pipe itself exceeds the temperature due to the pressure of the steam carried and as to whether sufficient care has been used to insulate the thermometers used in heat determinations. Observations on the transmission of steam in pipes should be made along the following lines, viz., *a*, the hourly weight of steam conveyed through the pipe; *b*, the hourly condensation in the pipe, *c*, steam pressure at the beginning and end of line; *d*, steam temperature at the beginning and end of line where observations relate to superheated steam; *d*, quality of steam at the beginning and end of line where the observations refer to saturated steam.

At this point a motion was made and carried that the council be empowered to appoint a committee to consider and experiment on the entire question of superheated steam.

At this point, M. W. Kellogg's paper on "Materials for the Control of Superheated Steam" was read, being advanced from the Friday morning session at the request of the author. This paper takes up the subject of materials for handling superheated steam and covers the several articles generally used as pipes, fittings, valves, joints, gaskets, etc., and gives compilations of data on the effect of heat on metals used in the construction of the above mentioned articles. The author recommends the use of cast steel pipings and fittings with superheated steam, together with the use of special van stone or welded joints. Mr. Foster, in discussing this paper, did not agree with Mr. Kellogg in regard to the difference between pipe lines carrying superheated and saturated steam. If a line is to be drawn at all it should be between moderate superheat and high superheat. A pipe line carrying a moderate superheat, say up to 500 degrees Fahr. would not differ materially from one carrying 150 pounds saturated steam. Mr. Foster did not agree with Mr. Kellogg's conclusions in respect to gaskets, nor to the use of cast iron, rather favoring cast iron.

J. Roland Brown, at this point, presented a discussion of both Mr. Foster's and Mr. Kellogg's papers. In regard to Mr. Kellogg's paper, he commended the use of van stone joints, but advocated at least one threaded and flanged joint in the line for convenience of make-up in the field. More pipe lines are injured by springing in the field because they do not agree with the drawings than by any other cause. The method of installing gaskets has more to do with their success than the style of gasket. Mr. Brown spoke of three successful types of gaskets, a long fiber asbestos gasket held with small quantity of binder and coated with graphite; a joint made by grinding together a male and female flange and inserting a soft steel corrugated gasket covered with graphite and oil; and two flanges with a groove into which a cast iron ring is inserted. This last type is especially good on heavy fittings.

In regard to Mr. Bolton's paper, Mr. Brown stated that where the superheater is located where it is not exposed to more than 1,000 degrees Fahr. it is unnecessary to flood the superheater when raising steam if fair judgment is used. When a superheater of the boiler setting type goes out of commission, it will cause the loss of only one unit and the ratio of superheating to water heating surface in the rest of the plant remains the same. When an independently-fired superheater goes out, it reduces all or a large part of the plant to saturated steam conditions. In large units, the boiler setting type of superheater, as now designed does not average over 175 degrees superheat, although some are sold to develop 200 degrees. In order to get the higher degree of superheat, it is necessary to increase the height of the boiler setting.

Mr. Foster in closing the discussion on his paper stated that in 75 per cent of the superheaters it is hard to justify the high specific heat with the amount of fuel consumption. That assuming a specific heat of 7.7 or over, too high an efficiency of the apparatus was obtained, for in 75 per cent of the superheaters it would be the same as the efficiency of the boiler, possibly not so good, but assuming a specific heat of 7.7 and over with 150 to 160 pounds pressure and 200 degrees superheat, as has been frequently proposed by experimenters it will be necessary to credit superheaters with an efficiency of 75 per cent, which is doubtful.

Hosea Webster, in discussing Mr. Bolton's paper said that the author had made a broad indictment of boiler manufacturers and that the paper reflects in a measure the opinion prevailing today, but that the absence of evidence and data to substantiate the indictment was due to the fact that they did not exist. Manufacturers welcomed suggestions supported by facts, looking to the improvement in quality and efficiency in their output, but that a society of the standing of the American Society of Mechanical Engineers should protect from the effect produced on superficial readers by vague statements.

A. H. Kruesi defended Mr. Bolton's paper and presented figures encountered in his practice to substantiate the statements.

Mr. Toltz considered the points made by Mr. Bolton to be well taken and that they should be considered by everyone who has charge of steam plants, which are being brought to a higher degree of economy by improving the steam. The degree of superheat fluctuates according to the temperature of the gases flowing around the superheater. Yet these imperfections can be overcome by regulating the quantity of the gases. The design of the superheater as well as its location must be considered as the coefficient of transmission per degree of temperature difference is variable. Engines also should be designed for high superheat differently from the present ones.

**The Cost of Heating Storehouses.**

H. O. Lacount presented a paper on "The Cost of Heating Storehouses." With wet pipe systems of automatic sprinklers, which give the best fire protection, it is necessary that storehouses be heated in winter. Usually they are unheated and the dry pipe system installed instead. An investigation of seven storehouses showed that the inside temperature changed gradually, not following the sudden changes out of doors, but were a good average of the outside temperatures seldom reaching the highest or the lowest outside rating. Assuming the cost of coal to be $4.25 per ton, the average cost of steam per 24 hours per 1,000 cubic feet of brick storehouse heated was 0.36 cents. The cost of a dry pipe equipment would be slightly less, but in general the difference would be negligible.

W. D. Ennis, in discussing this paper, found that it was frequently necessary to have a rough method of computing the cost of heating buildings, and in the vicinity of New York 0.1 cent per cubic foot will pay for the coal for one season. E. N. Trump told of the installation and experiments on dry and wet pipe systems of sprinklers, finding the dry pipe system to be troublesome and difficult to keep in order. Leakage of the valves is almost certain to occur, resulting in the freezing of the system. He favored the use of a calcium chloride solution in the sprinklers in the building, it be-

ing a non-freezing solution. Mr. Kinealey stated that the most important conclusion to be drawn from Mr. Lacount's paper was the lower the temperature of the heating medium the more economical was the system.

**Friday Session.**

The Friday morning session was held at Purdue University, the society being conveyed 60 miles to Lafayette by means of inter-urban traction cars. The cars left Indianapolis shortly after 8 o'clock, arriving at the university at 10:30. The society was welcomed by Prof. W. F. M. Goss, after which the visiting ladies withdrew and were entertained by the wives of the faculty, while the members devoted their time to a professional session, the following papers being presented: "Performance of Coal Superheaters," by W. F. M. Goss; "Experiences with Superheated Steam," by G. H. Barrus; "Superheated Steam in an Injector," by S. L. Kneass; "Use of Superheated Steam on Locomotives in America," by H. H. Vaughan; "Analysis of Locomotive Tests," by S. A. Reeve. Prof. Goss's paper detailed the experiments made on the locomotive installed at Purdue University, which is fitted with a superheater. Before the superheater had been applied, the experimental locomotive consumed 24 to 27 pounds of saturated steam, per indicated horsepower hour, while it now consumes 20 to 22 pounds of superheated steam per horsepower hour. There was but little discussion on this paper, and then Mr. Barrus' paper giving his experience with the use of superheated steam under varying conditions was read. Nine different installations were described and the writer presented conditions obtaining in each installation and the gain due to the use of superheated steam. As this paper was in the hands of the members previous to the meeting, it had been touched on and discussed in Thursday morning session, and consequently provoked but little comment at this time, and the society then listened to Mr. Kneass's paper on "The Use of Superheated Steam in an Injector," in which he discussed the action of steam in an injector, and the conditions tending to affect this action. He stated that the practical effect of superheated steam upon the action of an injector is to reduce the maximum capacity, increase the minimum capacity and to lower the limiting temperature of the water supply with which the injector can operate; further with high pressure and superheat an inefficiently designed instrument is inoperative.

Sydney A. Reeve's paper in which he analyzed the tests conducted on locomotives at the St. Louis exposition in 1904, elicited more comment than any presented at this session. The conclusions drawn by the author from his analysis are the results shown by the tests are incredible. A surprising loss of efficiency develops with the locomotives working under heavy load, which is not accounted for by the tests. In one particular case, the load is varied by 239 per cent and the rate of combustion by 372 per cent, in consequence of which the efficiency drops from 79.9 to 48.7. It is the personal belief of the author that the efficiency figures are correct and that the heat is lost up the stack without being measured. Prof. Goss, in discussing the paper, stated that the principal loss was due to unburned hydrocarbons and solid fuel, which passed up the stack and which would naturally be greater under heavy loads and with the higher draft, which would then occur. He defended the work of the committee, and stated that Mr. Reeve had used data not included in the A. S. M. E. committee report, but had probably drawn it from a publication of the Pennsylvania railroad. Dr. William Kent attacked the paper and stated that Hirn's analysis applied to steam engines and not to steam boilers.

H. H. Vaughan's paper entitled "Superheated Steam on Locomotives," was next taken up. This paper presents largely the results of tests made by the Canadian Pacific railroad on the use of superheaters, 197 locomotives of this road being equipped with devices of this character under different systems. The total number of superheaters in use on locomotives in the United States at the end of 1906 was 15. The Canadian Pacific railroad has conducted an extensive series of tests and has shown uniformly an increase in economy over locomotives not equipped with superheaters.

After the papers had been completed, Fred J. Miller offered a resolution of thanks to the local committee and all who had been concerned in the hearty welcome tendered the society, both at Indianapolis and Purdue. This was carried by a rising vote, after which the meeting adjourned to the upper floors of the agricultural building where the ladies of Purdue University served a New England dinner. The afternoon was devoted to a trip through the buildings of the university, and at 3 o'clock the party took the car which returned them to Indianapolis.

## COLLAPSING PRESSURE OF BESSEMER STEEL LAP WELDED TUBES.[1]

By Prof. Reid T. Stewart.

The paper to which this is a supplement gives the principal results of a very complete research on the collapsing pressures of commercial lap-welded steel tubes, the tubes when tested being in normal condition as to roundness. The test numbers refer to the previous paper.

While testing the 10-inch tubes No. 445 to 454, inclusive, the conditions were found to be such that with the apparatus in use, it was practicable to make a series of retests on each of these tubes. This was rendered possible because of the small extent of the recoil of the test apparatus which for these tubes caused but slight permanent distortion after each successive failure. Indeed, this permanent distortion in some cases was so slight as to be scarcely noticeable to the eye. See Fig. 1, which is a reproduction of a photograph taken after the removal of No. 450 to 454 from the test apparatus, after completion of the first test.

**Scheme of Successive Retests.**

The scheme followed while making these retests was as follows: *a*—Autographic calipering diagrams of the tubes, before insertion in the hydraulic test cylinder, were made in order to determine the precise initial out-of-roundness of the tube at each foot along its length. *b*—The tube was then inserted in the test cylinder and a fluid collapsing pressure was gradually applied as in the previous experiments, care being taken to stop the hydraulic pressure pump instantly on the gages showing that failure had occurred. *c*—The tube after removal from the test cylinder was carefully calipered for the purpose of determining the permanent distortion it had suffered, after which it was reinserted and the test proceeded with as before. In this way for tubes of comparatively thin walls, ten inches outside diameter and 20 feet long, a series of decreasing collapsing pressures was had corresponding to a series of increasing departures from roundness.

**Table of Successive Retests on 10-Inch Tubes.**

Table 2, showing successive retests, is an abstract from the Log of Collapsing Tests, and shows the effects of retesting No. 445 to 454, inclusive, according to the scheme above indicated. For convenience, the principal results of the first

[1] A paper presented at the Indianapolis (May, 1907,) meeting of the American Society of Mechanical Engineers.

Supplement to a paper by the author on "The Collapsing Pressures of Lap-Welded Steel Tubes," presented at the Chattanooga (May, 1906) meeting of the American Society of Mechanical Engineers, and abstracted in The Iron Trade Review, June 14, 1906.

tests are given in the accompanying table of successive retests. For example, in this table opposite test No. 446, we read for the first test, in column three, 225 pounds per square inch as the fluid collapsing pressure; in columns four and five, 10.44 and 9.60 inches as the maximum and minimum outside diameters of the tube, at place of greatest distortion, after collapse; in column six, 1.021 as the maximum divided by the minimum outside diameter at the place of collapse before the tube was placed in the hydraulic test cylinder, and, in column seven, 1.088 as this same ratio after failure of the tube had occurred. In the "remarks" column will be found the nominal and actual average outside diameters of tube, the average thickness of wall, the plain end weight, and the length of tube between transverse joints tending to hold it to a circular form. For more complete data relating to these tubes upon the first test look for their test numbers in the above reference, folder Fig. 39.

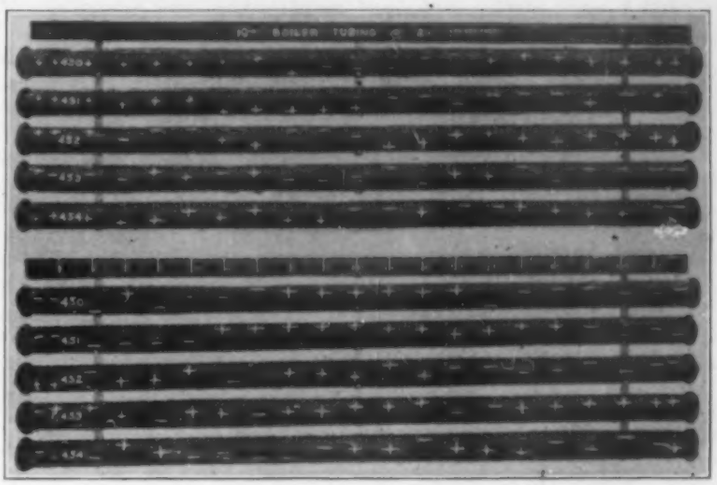

FIG. 1.—TESTS NO. 450-454, SHOWING SLIGHT PERMANENT DISTORTION RESULTING FROM FIRST FAILURE OF TUBES.

The principal results of the successive retests are found opposite the different retest numbers given in column two. Thus for test number 446 the first, second and third retests show respectively collapsing pressures of 150, 135 and 115 pounds, as compared with 225 pounds for the tube on its first test, or when free from distortion due to overstressing; that is to say, when the tube is normally round. Similarly the other columns of this table give for the different successive retests the values as indicated by their respective headings; thus in column six we find 1.09, 1.13 and 1.18 to be the maximum divided by minimum outside diameters at the place of greatest distortion before testing, for the first, sec-

TABLE II.—SUCCESSIVE RETESTS ON LAP WELDED BESSEMER STEEL TUBES, 10 INCHES OUTSIDE DIAMETER, 20 FEET LONG.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| TEST NO. | RETEST NO. | COLLAPSING PRESSURE LBS. PER SQ. IN. | AFTER COLLAPSE | | MAX. O.D. ÷ MIN. O.D. AT PLACE OF COLLAPSE | | REMARKS |
| | | | MAX. O.D. INCHES | MIN. O.D. INCHES | BEFORE TESTING | AFTER TESTING | |
| 445 | — | 210 | 11.18 | 8.67 | 1.024 | 1.289 | Nominal o. d. = 10 in. |
| | 1 | 87 | 11.37 | 8.42 | 1.289 | 1.350 | Actual average outside |
| | 2 | 82 | 11.44 | 8.34 | 1.350 | 1.372 | diam. = 10.037 in. |
| | 3 | 77 | 11.66 | 7.95 | 1.372 | 1.467 | Average thickness of wall |
| | 4 | 70 | 11.68 | 7.89 | 1.467 | 1.480 | = 0.167 in. |
| | 5 | 70 | 12.18 | 6.72 | 1.480 | 1.813 | Plain end weight per ft. = |
| | 6 | 60 | 12.83 | 5.36 | 1.813 | 2.394 | 17.55 lbs. |
| | | | | | | | Length of tube = 20 ft. |
| 446 | — | 225 | 10.44 | 9.60 | 1.021 | 1.088 | Nominal o. d. = 10 in. |
| | 1 | 150 | 10.52 | 9.30 | 1.088 | 1.131 | Actual average outside |
| | 2 | 135 | 10.76 | 9.12 | 1.131 | 1.180 | diam. = 10.031 in. |
| | 3 | 115 | 10.83 | 9.00 | 1.180 | 1.203 | Avefage thickness of wall |
| | 4 | 110 | 10.80 | 8.92 | 1.203 | 1.221 | = 0.167 in. |
| | 5 | 105 | 10.96 | 8.80 | 1.221 | 1.245 | Plain end weight per ft. = |
| | 6 | 100 | 11.03 | 8.67 | 1.245 | 1.272 | 17.59 lbs. |
| | 7 | 95 | 11.10 | 8.48 | 1.272 | 1.309 | Length of tube = 20 ft. |
| | 8 | 90 | 11.17 | 8.36 | 1.309 | 1.336 | |
| | 9 | 85 | 11.24 | 8.20 | 1.336 | 1.371 | |
| | 10 | 80 | 11.37 | 7.82 | 1.371 | 1.454 | |
| | 11 | 75 | 11.52 | 7.50 | 1.454 | 1.536 | |
| 447 | — | 240 | 10.58 | 9.50 | 1.020 | 1.114 | Nominal o. d. = 10 in. |
| | 1 | 150 | 10.71 | 9.30 | 1.114 | 1.152 | Actual average outside |
| | 2 | 135 | 10.96 | 8.94 | 1.152 | 1.226 | diam. = 10.045 in. |
| | 3 | 115 | 11.16 | 8.70 | 1.226 | 1.283 | Average thickness of wall |
| | 4 | 100 | 11.50 | 8.06 | 1.283 | 1.427 | = 0.166 in. |
| | 5 | 80 | 12.00 | 7.04 | 1.427 | 1.705 | Plain end weight per ft. = |
| | | | | | | | 17.50 lbs. |
| | | | | | | | Length of tube = 20 ft. |
| 448 | — | 240 | 10.52 | 9.51 | 1.035 | 1.106 | Nominal o. d. = 10 in. |
| | 1 | 175 | 11.08 | 8.86 | 1.106 | 1.251 | Actual average outside |
| | 2 | 115 | 11.18 | 8.74 | 1.251 | 1.279 | diam. = 10.035 in. |
| | 3 | 110 | 11.25 | 8.63 | 1.279 | 1.304 | Average thickness of wall |
| | 4 | 105 | 11.33 | 8.55 | 1.304 | 1.325 | = 0.170 in. |
| | | | | | | | Plain end weight per ft. = |
| | | | | | | | 17.94 lbs. |
| | | | | | | | Length of tube = 20 ft. |
| 449 | — | 210 | 10.60 | 9.48 | 1.023 | 1.118 | Nominal o. d. = 10 in. |
| | 1 | 135 | 10.70 | 9.31 | 1.118 | 1.149 | Actual average outside |
| | 2 | 120 | 10.82 | 9.11 | 1.149 | 1.188 | diam. = 10.055 in. |
| | 3 | 110 | 10.95 | 8.90 | 1.188 | 1.230 | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| TEST NO. | RETEST NO. | COLLAPSING PRESSURE LBS. PER SQ. IN. | AFTER COLLAPSE | | MAX. O.D. ÷ MIN O. D. AT PLACE OF COLLAPSE | | REMARKS |
| | | | MAX. O. D. INCHES | MIN. O.D. INCHES | BEFORE TESTING | AFTER TESTING | |
| 449 Continued | 4 | 100 | 11.04 | 8.71 | 1.230 | 1.268 | Average thickness of wall |
| | 5 | 90 | 11.16 | 8.57 | 1.268 | 1.302 | = 0.157 in. |
| | 6 | 80 | 11.22 | 8.37 | 1.302 | 1.341 | Plain end weight per ft. |
| | 7 | 75 | 11.31 | 8.18 | 1.341 | 1.383 | = 16.55 lbs. |
| | 8 | 70 | 11.37 | 8.06 | 1.383 | 1.407 | Length of tube = 20 ft. |
| | 9 | 65 | 11.88 | 6.70 | 1.407 | 1.773 | |
| 450 | — | 425 | 10.71 | 9.32 | 1.029 | 1.149 | Nominal o. d. = 10 in. |
| | 1 | 230 | 10.92 | 9.05 | 1.149 | 1.207 | Act. ave. o. d. = 10.037 in. |
| | 2 | 195 | 11.07 | 8.83 | 1.207 | 1.254 | Average thickness of wall |
| | 3 | 175 | 11.34 | 8.48 | 1.254 | 1.337 | = 0.206 in. |
| | 4 | 145 | 11.57 | 7.81 | 1.337 | 1.482 | Plain end weight per ft. = |
| | | | | | | | 21.57 lbs. |
| | | | | | | | Length of tube = 20 ft. |
| 451 | — | 390 | 10.79 | 9.28 | 1.020 | 1.163 | Nominal o. d. = 10 in. |
| | 1 | 205 | 10.97 | 9.02 | 1.163 | 1.216 | Act. ave. o. d. = 10.029 in. |
| | 2 | 175 | 11.17 | 8.78 | 1.216 | 1.272 | Average thickness of wall |
| | 3 | 150 | 11.52 | 8.41$_6$ | 1.272 | 1.370 | = 0.194 in. |
| | | | | | | | Plain end weight per ft. = |
| | | | | | | | 20.35 lbs. |
| | | | | | | | Length of tube = 20 ft. |
| 452 | — | 305 | 10.62 | 9.33 | 1.025 | 1.138 | Nominal o. d. = 10 in. |
| | 1 | 160 | 10.73 | 9.06 | 1.138 | 1.184 | Act. ave. o. d. = 10.005 in. |
| | 2 | 137 | 10.95 | 8.71 | 1.184 | 1.257 | Average thickness of wall |
| | 3 | 112 | 11.27 | 7.88 | 1.257 | 1.430 | = 0.185 in. |
| | 4 | 90 | 12.05 | 6.12 | 1.430 | 1.966 | Plain end weight per ft. = |
| | | | | | | | 19.43 lbs. |
| | | | | | | | Length of tube = 20 ft. |
| 453 | — | 395 | 10.75 | 9.25 | 1.024 | 1.162 | Nominal o. d. = 10 in. |
| | 1 | 200 | 10.95 | 9.03 | 1.162 | 1.213 | Act. ave. o. d. = 10.033 in. |
| | 2 | 170 | 11.15 | 8.77 | 1.213 | 1.271 | Average thickness of wall |
| | 3 | 150 | 11.36 | 8.25 | 1.271 | 1.377 | = 0.190 in. |
| | | | | | | | Plain end weight per ft. |
| | | | | | | | = 19.94 lbs. |
| | | | | | | | Length of tube = 20 ft. |
| 454 | — | 400 | 10.85 | 9.24 | 1.019 | 1.174 | Nominal o. d. = 10 in. |
| | 1 | 185 | 11.12 | 8.90 | 1.174 | 1.249 | Actual average outside |
| | 2 | 150 | 11.37 | 8.58 | 1.249 | 1.325 | diam. = 10.037 in. |
| | 3 | 125 | 11.75 | 7.94 | 1.325 | 1.480 | Average thickness of wall |
| | | | | | | | = 0.195 in. |
| | | | | | | | Plain end weight per ft. = |
| | | | | | | | 20.54 lbs. |
| | | | | | | | Length of tube = 20 ft. |

ond and third retests, respectively, as compared with 1.02 for the same tube when in its original normal condition.

The inference is then, for this particular case, namely, experimental tube No. 446, that these collapsing pressures of 225, 150, 135 and 115 pounds correspond to differences of outside diameters at place of failure, of 2, 9, 13 and 19 per cent, respectively.

**Chart of Results of Successive Retests.**

Fig. 3 shows the collapsing pressures due to the distortions caused by successive retests on the National Tube Co.'s lap-welded Bessemer steel tubes, ten

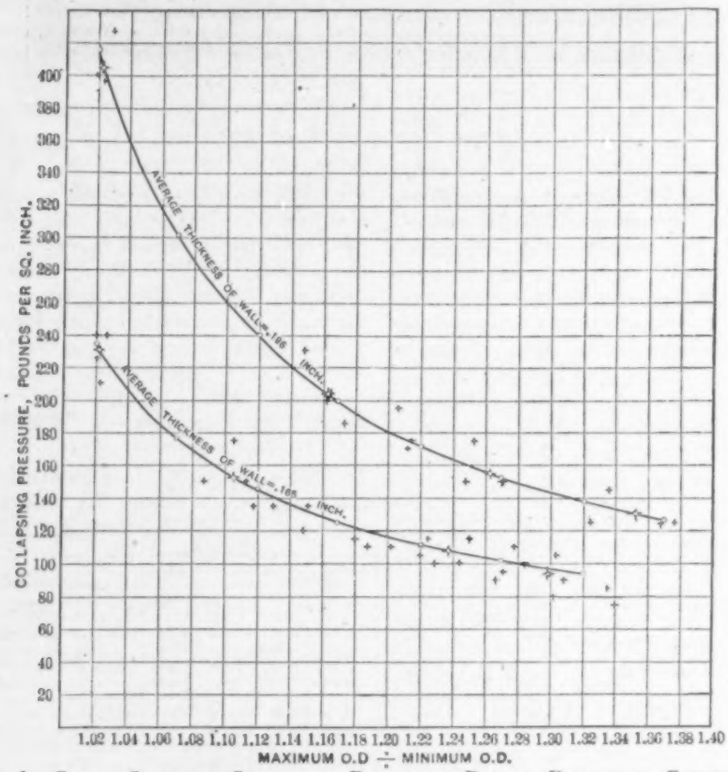


FIG. 3.—CHART SHOWING COLLAPSING PRESSURES DUE TO DISTORTION CAUSED BY SUCCESSIVE RETESTS ON LAP WELDED BESSEMER STEEL TUBES, 10 INCHES OUTSIDE DIAMETER, 20 FEET LONG.

inches outside diameter and 20 feet long, the retests being made on tubes of two thicknesses of wall, one averaging 0.165 and 0.196 inch.

It will be observed that the values of columns three and six of table 1 are plotted on this chart to a vertical scale representing collapsing pressure in pounds per square inch, and to a horizontal scale representing the out- of-roundness of the tube before insertion in the test cylinder, this out-of-roundness being represented by the quotient resulting from dividing the maximum by the minimum outside diameter at the place of greatest distortion.

In this chart the crosses represent plotted values of individual experiments, while combined crosses and circles represent the different group averages of these experiments.

An empirical formula has been derived to represent the series of values plotted, namely, those corresponding to tests No. 446-454, inclusive, omitting No. 452 as differing too much in thickness from the average of the group to which it belonged. Values calculated by means of this formula are plotted on the chart by means of the circles through which are drawn the curves that show how the collapsing pressure is related to out-of-roundness of tube caused by overstressing or thicknesses of 0.165 and 0.196 inch, for 10-inch tubes that are 20 feet long between end connections tending to hold them to a circular form.

This formula represents exceedingly well the results of the experiments on the lap-welded Bessemer steel tubes that were subjected to successive retests, as is evident from the curves representing the formula passing substantially through the group averages. The formula is:

$$P_2 = 0.0926 \frac{P_1 - 47.55}{(M - 0.874)^{1.35}} + 47.55$$

Where $P_1$ = collapsing pressure of normally round tube,

$P_2$ = that collapsing pressure of distorted tube, both expressed in pounds per square inch.

M = maximum divided by minimum outside diameters at place of greatest distortion.

This formula is strictly applicable, for the kind of distortion to which it applies, to lap-welded Bessemer-steel tubes for a range of thickness of wall from 0.15 to 0.20 inch for 10-inch tubes whose lengths are 20 feet between end connections, tending to hold them to a circular form. The practical range of applicability is, of course, beyond the above narrow limits, but to just what extent is as yet, in the absence of more complete experiments, unknown.

**Conclusions.**

A study of the chart, Fig. 3, showing the results of successive retests on two thicknesses of 10-inch lap-welded Bessemer steel tubes, will lead to the following conclusions, namely: *a*—There is a definite relation existing between the collapsing pressure of a tube and its out-of-roundness, as expressed by dividing the maximum by the minimum outside diamter at the place of greatest distortion. This is clearly shown by the remarkable smoothness of a curve drawn through the different group averages represented on the chart by combined circles and crosses. *b*—An out-of-roundness of ten per cent, corresponding to a difference in diameter of one inch for a 10-inch tube, which is about five times that of the commercial lap-welded tube while in its normal condition as to roundness, causes a decrease in the collapsing pressure of about one-third. From this it would appear that a lap-welded steel tube when in service, if designed with an ample safety factor, of say five for ordinary conditions, could not possibly fail because of any degree of out-of-roundness that would be apt to pass ordinary inspection.

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**The Omaha shops of the Union Pacific railroad have turned out two sample all steel box cars from designs of the motive power department. The cars weigh only 37,800 pounds, or two pounds less than the standard wooden car. The only difference in dimensions between the steel and wooden Union Pacific box car is that the steel car is 4½ inches wider and 2 inches longer. The length, 40 feet, is the same, but the steel car has a greater capacity by 50 cubic feet. Besides the element of greater safety and protection to goods in transit, it is believed that the steel car will have the advantage of requiring less repair than the wooden car, and consequently will be out of service less frequently, affording thereby better service as a freight carrier. The experiment of steel box cars will be watched with interest, as their success will mean the eventual passing of the wooden cars.**

# DEAN BROS. STEAM PUMP WORKS, INDIANAPOLIS.

During the past two years the Dean Bros. Pump Works has not only put upon the market such new forms of pumps as were required by the trade, but has redesigned its entire list of patterns in accordance with the most recently developed ideas of pump construction and low cost of production ence and shop practice. The shop system at this plant and those parts of the equipment which have been developed from private experience and belief are, therefore, of interest. The large number of small pieces to be assembled in the manufacture of a pump requires some method for keeping

Size 8 X 5 X 12
Style Simple
Comb No 1156 Order No 17949

PRODUCTION LIST.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1156 | 1 | Steam Cyl | 1 | C I | 1156 | 4 | Pump Cyl | 1 | C I |
| 1050 | 2 | Steam Cyl Head | 1 | C I | 1050 | 2 | Pump Cyl Head | 1 | C I |
| 1050 | 2 | Steam Piston | 1 | C I | | | Pump Cyl Lining | 1 | B T |
| 1050 | 2 | Steam Piston Packing Ring | 2 | C I | 1050 | 2 | Pump Cradle Head | 1 | C I |
| | | | | | 1050 | 4 | Pump Piston Head | 1 | C I |
| 5 | 2 | Steam Chest | 1 | C I | 1050 | 4 | Pump Piston Follower | 1 | C I |
| 5 | 2 | Steam Chest Heads | 2 | C I | | | Pump Piston Packing. | | |
| 5 | 2 | Steam Chest Piston | 1 | C I | 1156 | 3 | Valve Plate | 1 | C I |
| 5 | 2 | Main Slide Valve | 1 | C I | 1156 | 3 | Valve Chest Cover | 1 | C I |
| 5 | 2 | Small Slide Valve | 1 | C I | 024 | 15 | Valves (#1050) | 4 | C B |
| 5 | 2 | Starting Lever | 1 | C S | 024 | 15 | Valve Seats (#1050) | 4 | C B |
| 0265 | 1 | Starting Lever Stuff Box #5 | 1 | C S | 024 | 14 | Valve Stems #3 | 4 | C B |
| | | | | | 024 | 14 | Valve Springs #3 | 4 | B W |
| 0265 | 1 | Starting Lever Stuff Box Nut #5 | 1 | C B | 024 | 4 | Plates for Valves #3 | 4 | C B |
| | | | | | | | Valve Chest Cover Studs | 4 | M S |
| 0244 | 2 | Valve Rod (1/2"X 26 1/4") | 1 | F S | | | | | |
| 0244 | 2 | Valve Rod Clamp #5 | 1 | C I | | | | | |
| 942 | 3 | Valve Rod Dog | 1 | C B | | | | | |
| 5 | 5 | Valve Rod Link | 1 | C I | | | | | |
| 942 | 3 | Valve Rod Link Stud | 1 | F S | | | | | |
| 0265 | 1 | Valve Rod Stuff Box #5 | 1 | C B | | | | | |
| 0265 | 1 | Stuff Box Gland #5 | 1 | C B | | | | | |
| 0265 | 1 | Stuff Box Nut #5 | 1 | C I | | | | | |
| 942 | 3 | Lever | 1 | C I | | | | | |
| 942 | 3 | Lever Stud | 1 | F S | | | | | |
| 1156 | 2 | Stand | 1 | C I | | | | | |
| 1156 | 2 | Cross Head | 1 | C I | | | | | |
| 1050 | 2 | Piston Rod (1-5/16"X 49 1/4") | 1 | B S C | | | | | |
| 937 | 2 | Piston Rod Stuff Box Gland | 2 | C I | | | | | |
| 1050 | 2 | Cradle Bars (1-11/16"X 25 1/2") | 2 | F S | | | | | |
| 937 | 2 | Cradle Bar Nuts | 2 | M S | | | | | |
| 1050 | 2 | Steam Cradle Head | 1 | C I | | | | | |
| 0513 | 1 | Lever Stud Washer 1-1/64 | 1 | M S | | | | | |
| 0313 | 1 | Link Stud Washer 33/64" | 2 | M S | | | | | |

ORDER MEMORANDUM.

Workman Fitzmaster — CHARGE TIME TO ASSEM. JOB No. 49469
Valves C B — Pump Piston C I — Pump Cyl Lined B T
Stems C B — Steam Piston Std — Steam Cyl C I
Seats Scr — Rods B S C — Valve Mtg Std
Springs B W — Packing Metal

Date Rec'd Apr 13-07 — Date to Ship At Once — Shipped April 9-07 — Weight 600#
Test Pump 100# — Test Steam 100# — Service Hot Grease — Made Pump X — Photo X — Line Print X — Size 8 X 5 X 12 — Style S — Comb. No. 1156 — Order No. 17949

| | | | | | | |
|---|---|---|---|---|---|---|
| Exhaust Inlet | 4 | Pipe | Tap | | | |
| Inl. or Suction | 3 | " | " | | | |
| Discharge | 1 | " | " | | | |
| Pump Steam | 1 | 8 | " | | | |
| Pump Exhaust | 1 | 6 | " | | | |

Ord'd by Ed Gaspar Co Mt Vernon, Ohio
Ship to Same
Via Big 4 — Their Order 4934 A

FIGS. 1 AND 2.—PRODUCTION LIST AND ORDER MEMORANDUM.

with the ensuing reduced cost to the consumer. Every piece of the company's standard pumps, even to the smallest detail, has been altered and improved, so that the present Dean pump is at the same time entirely new, as well as the development of many years of experience.

The editorial representative of THE IRON TRADE REVIEW who visited the plant found that the keynote in the design of its pumps is shop experi- track of all the parts at every stage of the process. To accomplish this, a production list has been devised a fac-simile of which is shown in Fig. 1, on which is listed every standard part of the various styles of pumps manufactured, together with the "Drawing number" of each part. To the right of the list of parts is a blank column for checking each part as it goes from one department of the shop to another. When an order for a pump comes in, a production list for the size of pump required is registered for that order, and, in addition, an "order memorandum" shown in Fig. 2 is fastened to the bottom of the production list. On this form are noted the special requirements specified for this particular pump so that on one record sheet is a complete list of data for the pump to be made.

A photographic record is then made from this, together with two blue prints. The photographic negative is kept in the drawing room, one blue print is sent to the cost department in the office and the other to the shop, the original also being filed in the office. On every drawing each pattern is given a number which number is also placed on the pattern. A small slip shown in Fig. 3 is made out in the drawing room and sent to the clerk in charge of the pattern storage, who, on receipt of this order, delivers the required pattern to the foundry and files the slip with a clerk in the machine shop. The clerk in the machine shop, to whom has been sent the shop blue print of the production list, thereupon checks upon the part as being in the foundry. Prior to issuing the order to the pattern storage clerk a copy of the production list is sent to the stock room, where a number of the parts ready for assembling are stored. These parts are checked up on the production list as O. K. and the list returned to the drawing room, so that unnecessary orders will not be issued for parts already made.

In the stock room of the machine shop is kept a pigeonhole file of blue prints of each part, mounted on cardboard. When the casting comes into the machine shop it is checked off on the production list with the order number and when the job is given to a machine a blue print of the part is checked out to the machinist. This locates the work in the machine shop through every operation. The production list then goes to the assembling department where the various pieces are delivered from the machine shop coincident with the returning of the blue prints to the stock room. Deliveries to the testing department and to the shipping department are checked up on the original production list, and when the order is loaded the blue print is returned through the shop superintendent to the office. By this system, the material is completely checked

through the shop simply by the drawing number and the order number.

The machine shop, shown in Fig. 4, is equipped with an electric crane, but the work is largely handled by air hoists. The machine work is practically all done at the ordinary slow speeds of cast iron machining with the exception of the drilling which is done with high speed drills. On the drill presses are also used the rapid change chuck made by the Modern Tool Co., of Erie, Pa., by means of which one drill can be taken out and another chucked without stopping the tool, resulting in a very considerable saving of time. Beside the ordinary drills the company built for itself an extra heavy multiple drill by means of which, once being adjusted to the template, all the holes on one side of any similar piece can be drilled at a single operation without change. For boring the water cylinders a rig has been devised for machining eight pieces in one operation. The rig consists of a circular cage with top and bottom face plates. In the face plates are eight holes arranged in a circle over which the cylinders are centered and through which the boring bar is introduced.

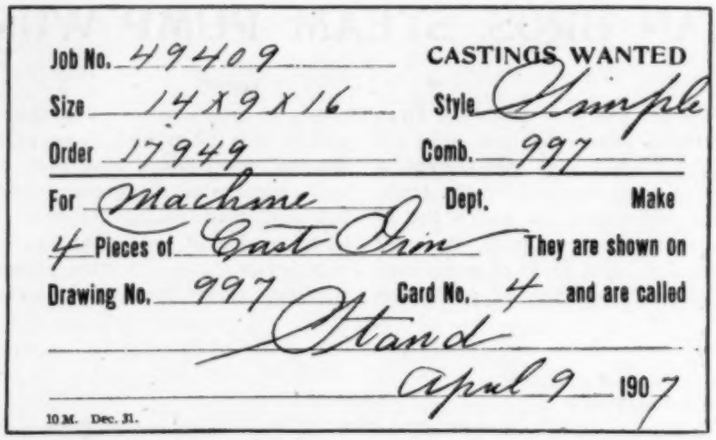
Job No. 49409 CASTINGS WANTED
Size 14 x 9 x 16 Style Simple
Order 17949 Comb. 997
For Machine Dept. Make
4 Pieces of Cast Iron They are shown on
Drawing No. 997 Card No. 4 and are called
Stand
April 9 1907
10 M. Dec. 31.

FIG. 3.—PATTERN ORDER.

The cage is then mounted in a multiple boring tool. Another rig has been devised for boring two cylinders at a time on a lathe. A double cradle casting which fits the circumference of the cylinders and rests on the ways of the lathe is set on the bed and the cylinders fastened into the cradles. A driving gear is centered in the face plate of the lathe, and on the boring bars, which pass through the two cylinders and are supported on the face plate at one end and the tail stock at the other, are mounted two engaging pinions for driving the boring bars. The feeding scheme will be readily understood. By this method almost half the time of setting up single pieces is saved.

In Fig. 5 is shown a heavy boring mill built in the company's shop and from its own design, being particularly adapted to the Dean cylinder construction and capable of taking a very

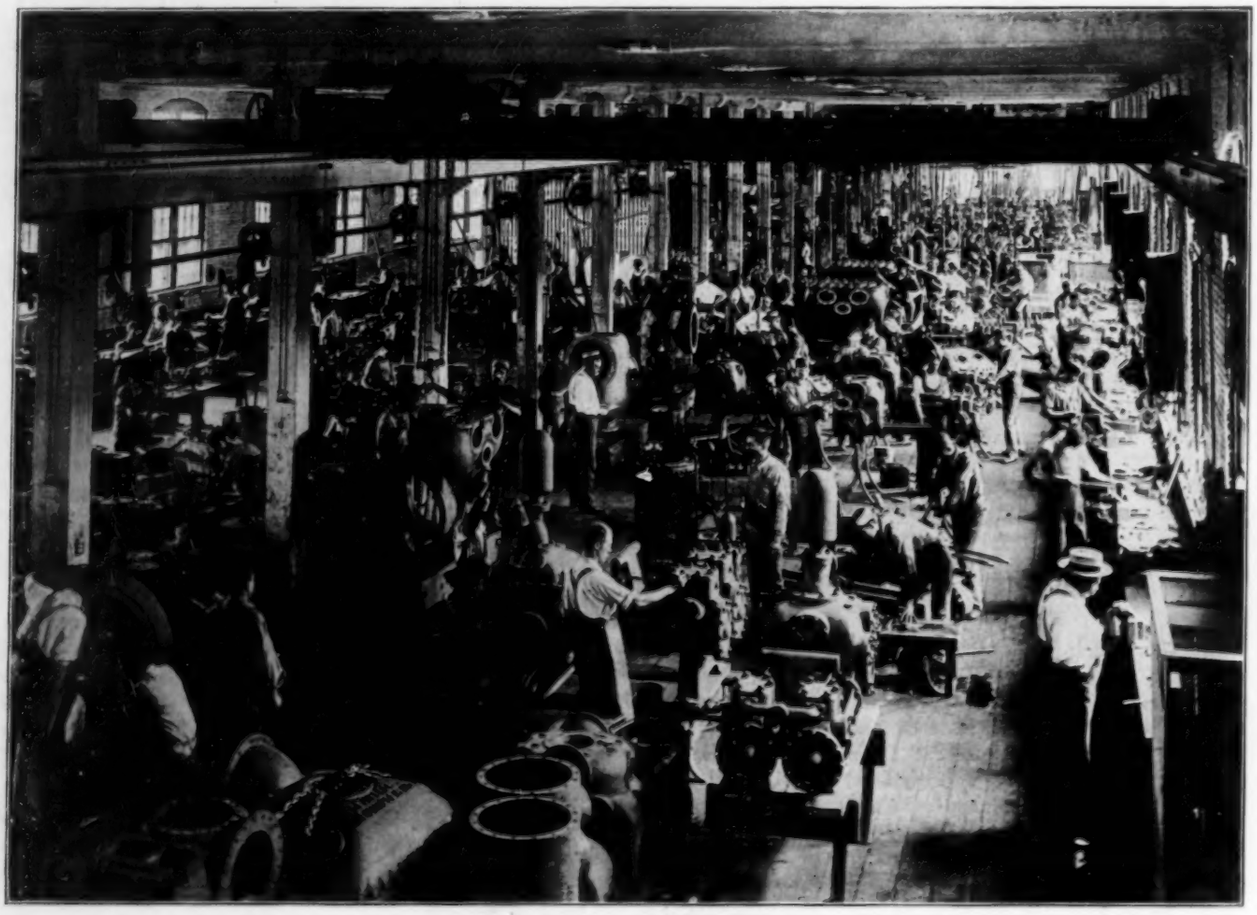

FIG. 4.—INTERIOR OF MACHINE SHOP.

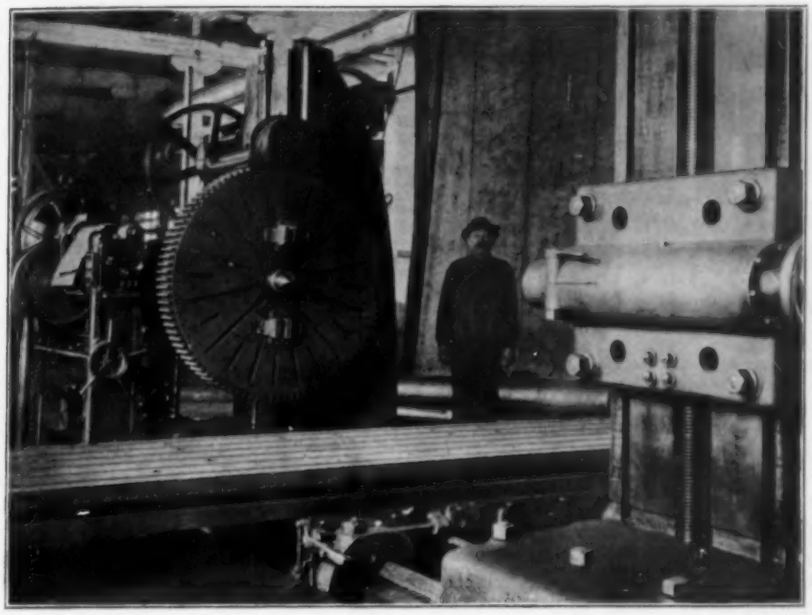

FIG. 5.—BORING MACHINE.

heavy cut with unusual accuracy. The tool is embedded in a solid concrete foundation and has an unusually large base. The work is fastened and the boring tool is fed through. Another point in the machining to which particular attention is paid is the tapping of the valve chambers for the screwing in of the valve seat. For the larger pumps, a special tool built by the Fosdick Machine Tool Co., of Cincinnati, O., is used, which has four speed gears, which can be thrown in consecutively, gradually increasing the speed without stoppage of the tool. This has been found to be an important feature in the accurate threading of these lap holes, for to have a cross thread, which oftentimes results even in hand tapping and much more frequently in machine tapping, particularly where the tap is entered at high speed, practically assures a leaky valve sooner or later. On this tool the tap can be entered slowly and the speed increased when the thread is started. The chief feature, however, tending toward low cost of production in the manufacture of these pumps is claimed to lie in the general principle, established by long experience, of continually watching the foundry and insisting on castings which can be most economically machined. The secret of this is largely in the production of clean castings, the avoidance of unnecessary metal and accurate molding. To accomplish these things the patterns are given ample, even unusual draft, enabling them to be drawn without breaking the corners of the mold, for almost invariably when the molder has to go over the mold a rough casting results. The patterns are continually kept in good repair, the expense of which has more than been repaid in the machine shop. Good facings are used in the foundry and the evidence of this general watchfulness is clearly shown in the appearance of the finished castings.

One of the largest savings in the machine shop resulting from accurate work in the foundry is the substitution of grinding for machine work on a large number of castings. The machine shop has a grinding department where both cast iron and brass are handled. The grinders consist of true steel face plates. On these are fastened emery cloths of various grades corresponding to the service demanded. These grinding surfaces can be replaced as they wear out, but will each average over one hundred pieces of work. The piece is set and locked on the grinder at whatever angle to the grinding surface desired and a finished surface can be obtained which is square and true. In every respect this is a saving over the lathe operation to accomplish the same result, but it is only feasible where care is taken in the matter of castings.

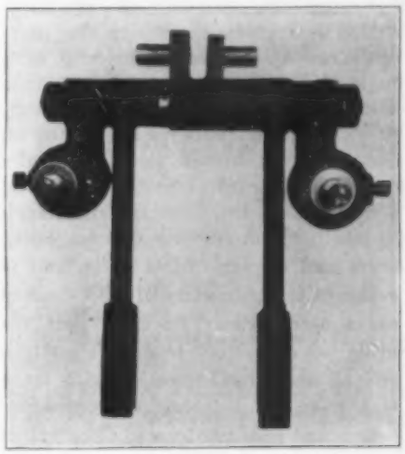

FIG. 7.—ROCKER SHAFT.

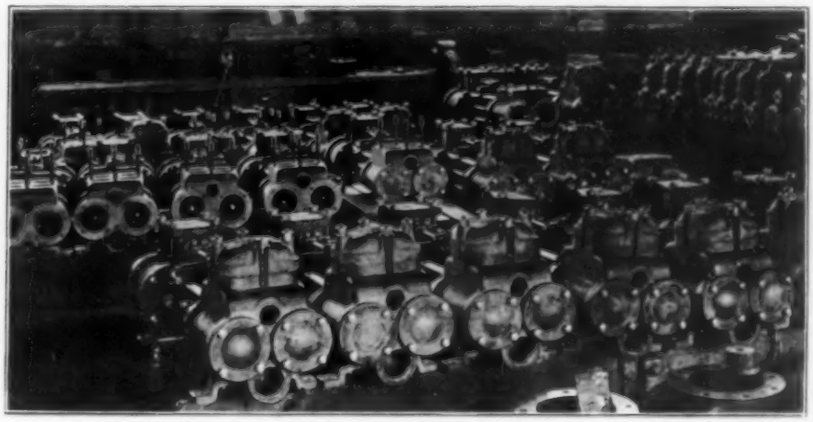

FIG. 6.—GROUPS OF PUMPS BEING ASSEMBLED.

So far as possible the assembling is done in groups, as shown in Fig. 6. The pumps are all tested to double the pressures required of them before leaving the shops. Three general features developed in the redesigning of the pumps are particularly worth mentioning. They are shown in Figs. 6, 7, 8 and 9. In contrast to common practice, the rocker shaft for operating the steam valves on the duplex pump has been abandoned for a one-piece lever. The advantages are apparent and this form of construction is made possible with the change from the cast iron frame cast solid with the two ends, to the tie rod connection of

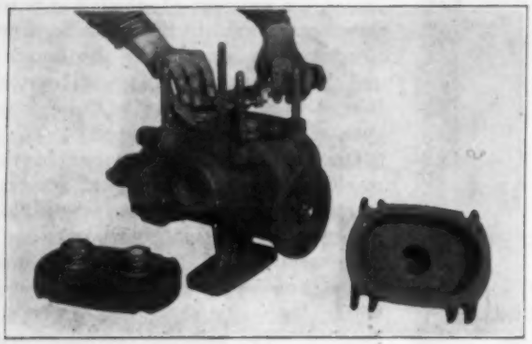

FIG. 8.—CYLINDER, SHOWING ACCESSIBILITY TO WRENCH.

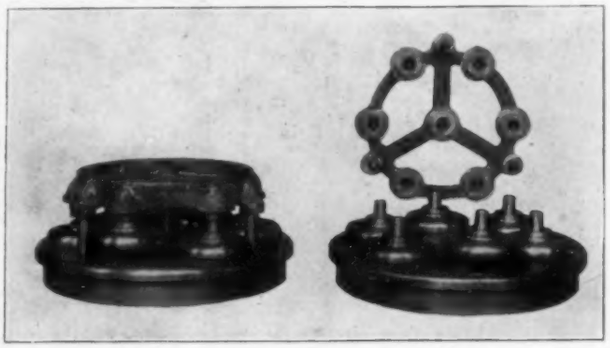

FIG. 9.—VALVE CAPS OF PUMP.

steam and water end, which enables either end to be replaced independently of the other. Fig. 8 illustrates a result which has been obtained in the design, permitting every nut to be reached with a monkey wrench. The third feature, Fig. 9, shows the new valve cage so designed that an entire set of valves are held solidly as one piece in the pump and can be lifted out for examination with ease.

Among the new styles of Dean pumps just being placed on the market is a duplex, hydraulic pump with compound steam ends and plunger hydraulic water ends, shown in Fig. 10. The steam cylinders are 24 and 36 inches by 24 inches stroke and the pump plunger 6¼ inches diameter. The pump is intended for the heavy hydraulic requirements of steel mills, brass and copper rolling mills, and is designed for a pressure of 1,000 pounds per square inch. The valve pots are made of cast steel from one pattern and so are interchangeable with large free passages reducing the corroding action and pressure losses. The valves and seats, which are of bronze, have flat instead of cone bearings by which design it is claimed the wear is largely decreased. Wear on cone bearing valves results in a greater lift of valves than was intended producing a more or less hammer.

The plunger cylinders and cross heads are of steel. The life of the plungers is conserved by deep brass bushed stuffing boxes and glands and instead of the usual slide and slipper arrangement the weight of the plungers is carried on bearings at the sides. In this design drippings from the plunger stuffing boxes do not fall on the slipper bearing, thus washing away the oil and leaving an unlubricated wearing surface. The steam cylinders are arranged for the natural drainage of water and condensed steam from the high pressure cylinder out through the exhaust, and an automatic cushioning device is provided to prevent the pistons striking the cylinder heads no matter what the speed of pressure at which the pump is working.

The Dean Bros. Steam Pump Works is entirely a non-union shop. In their experience, they have found absolutely no occasion to regret the absence of union men among their employes, and it is their tribute to the non-union workmen that a happier condition of mutual confidence and contentment in which employer and employe share alike, could not be found than has existed for a number of years at this plant.

## EXPORTS BREAK RECORD.

Iron and steel exports from the United States in the fiscal year which ends with June will aggregate approximately $175,000,000 in value, against $57,000,000 a decade earlier and $16,000,000 two decades earlier, says a bulletin issued by the bureau of statistics of the department of commerce and labor. Figures compiled by the bureau show the value of iron and steel manufactures exported in the 10 months ending with April, 1907, to be about $150,000,000, and it is estimated that the full year will round out the $175,000,000 mark. Of the $132,000,000 worth of iron and steel manufactures exported in the nine months ending with March, 1907, nearly $7,000,000 represented the value of locomotives shipped, more than $6,000,000 that of steel rails, about $5,000,000 structural iron and steel, nearly $7,000,000 metal-working machinery, over $6,000,000 electrical machinery and over $17,000,000 miscellaneous machinery.

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The Kansas City Structural Steel Co., Kansas City, Mo., has been incorporated with a capital of $50,000. The officers of the new company are: H. A. Fitch, president; O. C. Smith, vice president; A. L. Cooper, secretary, and M. M. Sweetman, treasurer.

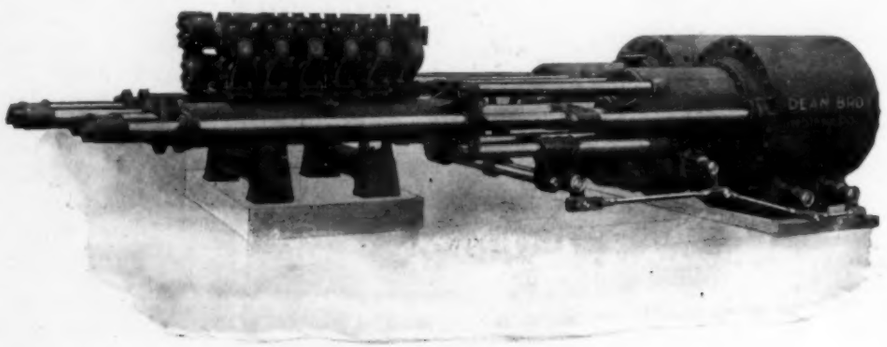

FIG. 10.—RECENT DUPLEX HYDRAULIC PUMP.

# MANGANESE IN CAST IRON.[1]

By Herbert E. Field, Pittsburg, Pa.

The literature in regard to the effect of manganese in cast iron contains many contradictory statements. As is usual in such cases, these statements were correct for the work with which the writers were familiar. The errors come from drawing general conclusions from special experiments. Four years ago, in a paper before your association, I called attention to the confusing statements in regard to carbon in iron. I then cited two opposite statements made by different authorities and showed that both were correct in the limited area of their experiments. Today I wish to reconcile the diverse opinions in regard to manganese in cast iron.

**Effects of Manganese on Hardness.**

One authority states that manganese hardens iron, while another as confidently asserts that it has a softening influence. Both are correct. There are two conditions which determine the effects of manganese on iron; first, the percentage of sulphur present and second, the amount of manganese. These two conditions are so bound up with one another that it is almost impossible to consider them separately.

Manganese tends to increase the per cent of total carbon; to increase the amount of carbon held in the combined condition; to decrease the sulphur; and to neutralize the effect of the sulphur.

**Action of Manganese in Increasing Carbon.**

Manganese itself will hold more carbon in combination or solution than will iron, hence, an increase in the per cent of manganese in an iron tends to increase the carbon. This is especially true in cases where the manganese is added to the ladle as ferro-manganese or spiegel, since the per cent of carbon in these two increases the per cent of carbon in the whole.

When the manganese is charged into the cupola, it acts in two ways to increase the carbon. First, it partially prevents the carbon from being oxidized when the iron passes through the melting zone of the cupola, and second it increases the absorption power of the iron for carbon and hence, the iron in passing through the incandescent coke, will absorb more carbon. The higher the manganese present, the greater will be the amount of carbon so absorbed. In the paper above referred to, I pointed out that, other things being equal, the higher the total carbon, the softer will be the cast iron. An increase in the manganese then, tends to soften the iron by increasing the total carbon.

**Action of Manganese in Increasing Combined Carbon.**

The softening tendency, due to the manganese raising the total carbon, is to a certain extent, counter-balanced by the action of manganese in forming combined carbon. This combined carbon is not the hardening carbon which gives the intense hardness to quenched steel but is a definite compound of manganese and carbon. The carbon so united is called carbide-carbon. It is this tendency to form a hardening carbide that has led many to state that manganese hardens cast iron. The hard, gritty nature of some high manganese irons is due to this carbide. We are all familiar with the high manganese pig irons which have a dark, open No. 1 fracture, which, even to the expert eye, would be graded as a number 1. When we try to drill this iron, we find that it is almost impracticable to do so with any ordinary drill and with specially hardened and shaped drills, it grinds rather than cuts. This peculiar nature of high manganese iron which makes it so hard to drill is due to an innumerable number of small particles of this very hard carbide.

**Action of Manganese in Decreasing Sulphur.**

It has long been known that manganese tends to eliminate sulphur from iron in passing through the cupola. This elimination is due to the fact that manganese forms a compound of sulphur which separates out of iron at a high temperature. This temperature is above the melting point of iron and hence the compound passes off into the slag. Sulphur hardens iron and, as manganese tends to eliminate sulphur, it has a decided softening influence upon the iron. This influence, of course, is an indirect one, as it is due to the absence of the sulphur rather than to the presence of the manganese.

There has been considerable discussion in the last few years over the value of manganese ore as an eliminator of sulphur in cupola work. Some German experimenters have stated that a large proportion of sulphur may be removed by the correct use of manganese ore and limestone. Some of our American foundrymen working on the same lines, have obtained results which are not nearly so convincing. Many reasons have been given for this discrepancy in results and the prevailing opinion seems to be that the difference is one of temperature. The use of manganese ore in cupola practice is open to several objections and as high manganese iron can be readily obtained which will introduce the manganese in a very satisfactory manner, the former method is hardly to be recommended for ordinary cupola practice.

**Notes on Previous Work.**

A few notes on previous work on this subject might be of interest. A. E. Outerbridge, in a lecture before the Franklin Institute, in 1888, called attention to the remarkable effect of the addition of a small amount of manganese to a ladle of cast iron. Prof. Turner, the English metallurgist, states that manganese eliminates the sulphur as in manganese sulphide which floats on the surface of the molten iron, thus forming a part of the slag which collects at the top of the metal.

Walrand melted cast iron high in sulphur in one crucible and manganese in another crucible and when the two were poured together, a strong odor of burning sulphur was given off. The sulphur was reduced from 0.5 to 0.06 per cent.

Caron's experiments along the same line gave the same result and he is said to be the first to call attention to this peculiar feature of manganese, in its action on sulphur.

J. W. Stead melted 100 parts of ferro-manganese with sulphide of iron in a crucible. The metal produced showed 0.02 per cent sulphur while the slag analyzed 28 per cent sulphur and 56 per cent manganese.

**The Action of Manganese in Neutralizing the Effect of Sulphur.**

We have noted that the effects of manganese in eliminating sulphur was due to the formation of a sulphide of manganese which floated to the top of the iron and formed a part of the slag.

Prof. Le Chatelier and Mr. Ziegler first suggested that this effect was

[1]Paper presented before Philadelphia convention of American Foundrymen's Association, May, 1907.

produced by the segregation of sulphide of iron at a temperature above the melting point of iron.

**Effects of Sulphur.**

The effects of sulphur on iron are too well known to be discussed here. It makes iron short, brittle, and hard. Excessive amounts make it very weak. These effects of sulphur are due to the fact that when cast iron solidifies, the sulphur is still in a gaseous state and each particle of iron is surrounded by a wall of gaseous sulphur. When the iron cools, the gas solidifies or unites with the surrounding crystals of iron as iron-sulphide. In this latter condition, it occupies much less volume than when it was in the gaseous state. This leaves the crystals of iron surrounded by small spaces which, under the microscope, have the appearance of very minute cracks. These cracks give to the iron the brittle, short property characteristic of high sulphur iron.

The point to be borne in mind in this connection is that the sulphur is in the form of a gas when the iron sets.

Let us go back for a moment and consider the effect when manganese was added to irons high in sulphur. The manganese united with the sulphur and the sulphide of manganese separated out at a temperature above the melting point of iron or, in other words, while the iron was in a liquid condition so that when the iron solidifies, there will be no sulphur left as a gas to form microscopic cracks, it having already united with the manganese to form sulphide of manganese. The bad properties due to high sulphur would, therefore, be removed. In place of the gaseous sulphur, we have present a sulphide of manganese which will rise to the top of the iron as a slag, provided sufficient time is given for it to do so. If, however, there is not sufficient time, the sulphide of manganese is held in the iron in suspension, in the form of infinitely small, solid particles. These are invisible to the naked eye and do no more harm than so many particles of any solid substance.

There are times, however, when the casting remains liquid for a long time that this sulphide of manganese will segregate together towards the top of the casting and form bad spots which are difficult to obviate and which are frequently blamed to very different causes.

In spite of the fact that the effects of sulphur on steel and the effects of manganese on sulphur have been known for a considerable time, it has only been within a comparatively short time that this knowledge has been applied in a practical way, or that the facts have been brought together and a lucid explanation given of the cause and effect of the additions of manganese to steels high in sulphur. The credit of bringing this subject again to the attention of metallurgists is due to J. O. Arnold.

While working on a sample of steel rail high in sulphur, furnished by Mr. Brinell and recorded as giving good results, he discovered that instead of the fine, microscopic cracks which would be expected from so high sulphur percentage, that the steel showed in place threads of what appeared to be slag running length-wise with the rail. This was manganese sulphide and proved to be no more harmful to the rail than the fine threads of slag contained in wrought iron are to that product.

If we apply this to cast iron, we find the same conditions exist. The effect of manganese on cast iron, which has not previously been explained, under the light of this knowledge becomes clear. The statement that manganese softens iron is readily believed when we appreciate that it forms a compound with the sulphur thus removing its hardening effect. The strengthening effect of manganese is easily explained when we consider that it removes the small, microscopic cracks caused by the sulphur.

It is very readily proved that manganese does unite with sulphur to form the sulphide of manganese in cast iron. It is not possible to separate it from iron by analysis but its tendency to rise to the top of the casting gives us a desired opportunity to prove our question.

Chas. H. Risdale gives the analysis of an ingot mold which showed in the top part 1.35 per cent manganese and 0.75 per cent sulphur, while the bottom part of the same mold showed 0.11 per cent sulphur and but 0.54 per cent manganese. An analysis recently sent me of a cylinder but 24 inches long and 9 inches in diameter gave the following analysis for sulphur and manganese at the top and bottom of the cylinder:

2 in. from bottom..Sul.0.148 per ct. Mang.0.54
½ in. from top....Sul.0.204 per ct. Mang.0.66

It will be noted that this cylinder was but 24 inches long and that the time taken for it to solidify would be comparatively short and hence the time allowed for the sulphide of manganese to rise would be of a very short duration.

The top of a water pipe cast on end gave sulphur 3.06 per cent, manganese, 1.136 per cent, while the bottom end showed but 0.076 per cent sulphur and 0.584 per cent manganese. The top of another pipe gave 0.43 per cent sulphur and 1.79 per cent manganese, but, unfortunately, no piece from the lower part was saved. These show a simultaneous segregation of manganese and sulphur from molten iron. Inasmuch as manganese would not be expected to segregate by itself, it would appear that this compound must separate out and rise to the top of molten cast iron.

The writer considers that this explanation of the effects of manganese on cast iron reconciles the conflicting statements in regard to the same. It explains the segregation of sulphur and pig iron which has long been known but never explained. It shows why sulphur makes iron weak and that when united with manganese, it has practically no weakening effect on iron. It explains the remarkable effect of small amounts of manganese when added to a ladle of cast iron. It shows why high manganese may cause dirty iron.

## REPORT OF COMMITTEE ON STANDARD METHODS FOR THE ANALYSIS OF IRON.[1]

At the annual convention of the Association in 1905, this committee reported a method for the determination of silicon in iron, and last year added methods for determining total carbon and sulphur. The committee now adds methods for determining graphitic carbon, manganese and phosphorus, thus including all the determinations usually made on iron in which occasion for difference between the buyer and seller is apt to arise. This report will therefore include all the methods decided upon.

We would also like to call attention to the following quotation from the report of 1905, which indicates the intentions of these methods.

"In recommending the above method, it was recognized that it is almost an impossibility to get chemists to use a standard method in their daily work. Hence the above method, as recommended, is intended primarily as a check method in case of dispute be-

[1]Presented at Philadelphia Meeting, American Foundrymen's Association, May, 1907.

tween laboratories, or as between buyer and seller.

"Hence a method, accurate in every point was sought, shortness being sacrificed to some extent to insure accuracy or the chance of error by a careless operator. Little in the above is left to the judgment of the chemist.

"It will be further recognized that in the purchase and sale of pig iron or castings under specification, that standard methods are essential in order to allow the parties of both parts to make their determinations with the assurance that, on the score of method, they are on the same footing."

We wish also to emphasize the ideas involved in the selection of members of this committee—that is to have representatives from commercial laboratories as well as works chemists, and to have members from different sections of the country. The success in carrying out these ideas will be seen by the following list of members:

Andrew A. Blair, Booth, Garrett & Blair, Philadelphia.
H. E. Diller, chemist, Western Electric Co., Chicago.
H. E. Field, metallurgical engineer, Mackintosh, Hemphill & Co., Pittsburg.
R. F. Flinterman, chief chemist, McCormick division, International Harvester Co., Chicago.
Allan P. Ford, metallurgist, Eaton, Cole & Burnham Co., Bridgeport, Conn.
J. O. Handy, chief chemist, Pittsburg Testing Laboratory, Pittsburg.
J. R. Harris, chief chemist, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
H. C. Loudenbeck, chief chemist, Westinghouse Air Brake Co., Pittsburg.
R. S. MacPherran, chief chemist, Allis-Chalmers Co., Milwaukee.
W. G. Scott, chief chemist, J. I. Case Threshing Machine Co., Racine, Wis.
Henry Souther, Henry Souther Engineering Co., Hartford, Conn.
Prof. Thomas B. Stillman, Stevens Institute of Technology, Hoboken, N. J.

### Determination of Silicon.

"Weigh one gramme of sample, add 30 c. c. nitric acid (1.13 sp. gr.); then 5 c. c. sulphuric acid (conc). Evaporate on hot plate until all fumes are driven off. Take up in water and boil until all ferrous sulphate is dissolved. Filter on an ashless filter, with or without suction pump, using a cone. Wash once with hot water, once with hydrochloric acid, and three or four times with hot water. Ignite, weigh, and evaporate with a few drops of sulphuric acid and 4 or 5 c. c. of hydrofluoric acid. Ignite slowly and weigh. Multiply the difference in weight by .4702, which equals the per cent of silicon."

### Determination of Sulphur.

Dissolve slowly a three gram sample of drillings in concentrated nitric acid in a platinum dish covered with an inverted watch glass. After the iron is completely dissolved, add two grams of potassium nitrate, evaporate to dryness and ignite over an alcohol lamp at red heat. Add 50 c. c. of a one per cent solution of sodium carbonate, boil for a few minutes, filter, using a little paper pulp in the filter if desired, and wash with a hot one per cent sodium carbonate solution. Acidify the filtrate with hydrochloric acid, evaporate to dryness, take up with fifty c. c. of water and two c. c. of concentrated hydrochloric acid, filter, wash and after diluting the filtrate to about 100 c. c. boil and precipitate with barium chloride. Filter, wash well with hot water, ignite and weigh as barium sulphate, which contains 13.733 per cent of sulphur.

### Determination of Phosphorus.

Dissolve two grams sample in fifty c. c. nitric acid (sp. gr. 1.13), add 10 c. c. hydrochloric acid and evaporate to dryness. In case the sample contains a fairly high percentage of phosphorus it is better to use half the above quantities. Bake until free from acid, redissolving in twenty-five to thirty c. c. of concentrated hydrochloric acid, dilute to about sixty c. c., filter and wash. Evaporate to about twenty-five c. c., add twenty c. c. concentrated nitric acid, evaporate until a film begins to form, add thirty c. c. of nitric acid (sp. gr. 1.20) and again evaporate until a film begins to form. Dilute to about 150 c. c. with hot water and allow it to cool. When the solution is between 70 degrees and 80 degrees C. add fifty c. c. of molybdate solution. Agitate the solution a few minutes, then filter on a tarred Gulch crucible having a paper disc at the bottom. Wash three times with a three per cent nitrate acid solution and twice with alcohol. Dry at 100 degrees to 105 degrees C. to constant weight. The weight multiplied by 0.0163 equals the per cent of phosphorus in a one gram sample.

To make the molybdate solution add one hundred grams molybdate acid to 250 c. c. water, and to this add 150 c. c. ammonia, then stir until all is dissolved and add 65 c. c. nitric acid (1.42 sp. gr.). Make another solution by adding 400 c. c. concentrated nitric acid to 1100 c. c. water, and when the solutions are cool, pour the first slowly into the second with constant stirring and add a couple of drops of ammonium phosphate.

### Determination of Manganese.

Dissolve one and one-tenth grams of drillings in twenty-five c. c. nitric acid (1.13 sp. gr.), filter into an Erlenmeyer flask and wash with thirty c. c. of the same acid. Then cool and add about one-half gram of bismuthate until a permanent pink color forms. Heat until the color has disappeared, with or without the precipitation of manganese dioxide, and then add either sulphurous acid or a solution of ferrous sulphate until the solution is clear. Heat until all nitrous oxide fumes have been driven off, cool to about 15 degrees C.; add an excess of sodium bismuthate — about one gram — and agitate for two or three minutes. Add fifty c. c. water containing thirty c. c. nitric acid to the liter, filter on an asbestos filter into an Erlenmeyer flask, and wash with fifty to one hundred c. c. of the nitric acid solution. Run in an excess of ferrous sulphate and titrate back with potassium permanganate solution of equal strength. Each c. c. of N-10 ferrous sulphate used is equal to 0.10 per cent of manganese.

### Determination of Total Carbon.

This determination requires considerable apparatus; so in view of putting as many obstacles out of the way of its general adoption in cases of dispute your committee has left optional several points which were felt to bring no chance of error into the method.

The train shall consist of a pre-heating furnace, containing copper oxide (Option No. 1) followed by caustic potash (1.20 sp. gr.), then calcium chloride, following which shall be the combustion furnace in which either a porcelain or platinum tube may be used (Option No. 2). The tube shall contain four or five inches of copper oxide between plugs of platinum gauze, the plug to the rear of the tube to be at about the point where the tube extends from the furnace. A roll of silver foil about two inches long shall be placed in the tube after the last plug of platinum gauze. The train after the combustion tube shall be anhydrous cupric sulphate, anhydrous cuprous chloride, calcium chloride, and the absorption bulb of potassium hydrate (sp. gr. 1.27) with prolong filled with calcium chloride. A calcium chloride tube attached to the aspirator bottle shall be connected to the prolong.

In this method a single potash bulb shall be used. A second bulb as sometimes used for a counterpoise being more liable to introduce error than correct error in weight of the bulb in use, due to change of temperature or moisture in the atmosphere.

The operation shall be as follows: To one gram of well mixed drillings add 100 c. c. of potassium copper chloride solution and 7.5 c. c. of hydrochloric acid (conc.). As soon as dissolved as shown by the disappearance of all copper, filter on previously washed and ignited asbestos. Wash thoroughly the beaker in which the solution was made with 20 c. c. of dilute hydrochloric acid (1.1), pour this

on the filter and wash the carbon out of the beaker by means of a wash bottle containing dilute hydrochloric acid (1.1) and then wash with warm water until all the acid is washed out of the filter. Dry the carbon at a temperature between 95 and 100 degrees C.

Before using the apparatus a blank shall be run and if the bulb does not gain in weight more than 0.5 milligram, put the dried filler into the ignition tube and heat the preheating furnace and the part of the combustion furnace containing the copper oxide. After this is heated start the aspiration of oxygen or air at the rate of three bubbles per second, to show in the potash bulb. Continue slowly heating the combustion tube by turning on two burners at a time, and continue the combustion for thirty minutes if air is used; twenty minutes if oxygen is used. (The Shimer crucible is to be heated with a blast lamp for the same length of time.)

When the ignition is finished turn off the gas supply gradually so as to allow the combustion tube to cool off slowly and then shut off the oxygen supply and aspirate with air for ten minutes. Detach the potash bulb and prolong, close the ends with rubber caps and allow it to stand for five minutes, then weigh. The increase in weight multiplied by 0.27273 equals the percentage of carbon.

The potassium copper chloride shall be made by dissolving one pound of the salt in one liter of water and filtering through an asbestos filter.

Option No. 1.—While a pre-heater is greatly to be desired, as only a small percentage of laboratories at present use them, it was decided not to make the use of one essential to this method; subtraction of the weight of the blank to a great extent eliminating any error which might arise from not using a pre-heater.

Option No. 2.—The Shimer and similar crucibles are largely used as combustion furnaces and for this reason it was decided to make optional the use of either the tube furnace or one of the standard crucibles. In case the crucible is used it shall be followed by a copper tube 3-16 inch inside diameter and ten inches long, with its ends cooled by water jackets. In the center of the tube shall be placed a disk of platinum gauze, and for three or four inches in the side towards the crucible shall be silver foil and for the same distance on the other side shall be copper oxide. The ends shall be plugged with glass wool, and the tube heated with a fish tail burner before the aspiration of air is started.

**Graphite.**

Dissolve one gram sample in thirty-five c. c. nitric acid (1.13 sp. gr.) filter on asbestos, wash with hot water, then with potassium hydrate (1.1 sp. gr.) and finally with hot water. The graphite is then ignited as specified in the determination of total carbon.

H. E. Diller, Secretary

## ELECTRIC UNLOADING CRANES FOR PANAMA.

The accompanying illustrations show one of a lot of eight cranes now under construction by the Shaw Electric Crane Co., of Muskegon, Mich., for the Panama Railroad Co. They are for use in handling miscellaneous freight at the Laboca wharf which is the Pacific terminus of the railroad.

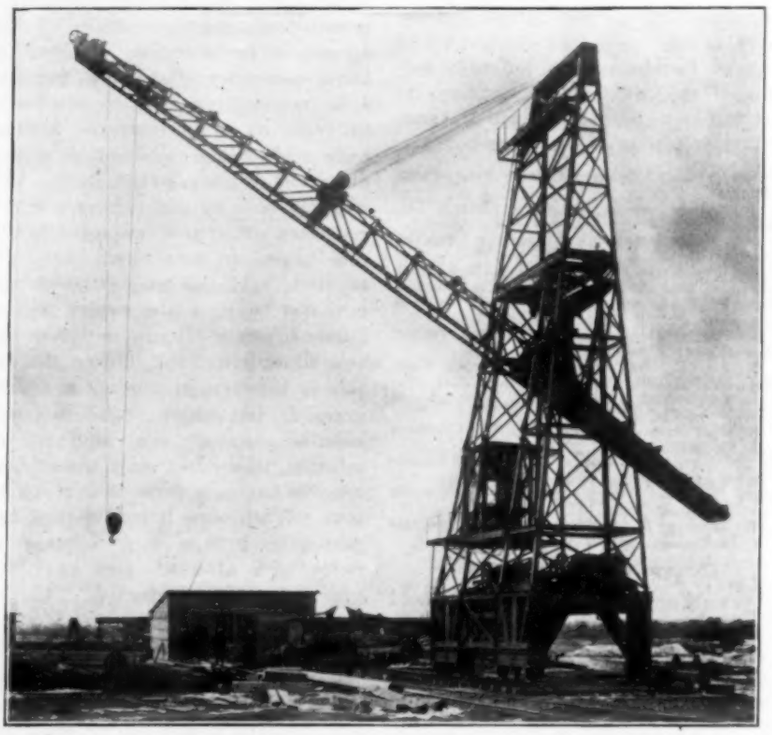

Fig. 1.—Electric Unloading Crane at Panama—Working Position.

The cranes were designed to meet the peculiar conditions existing at the wharf, among which may be menioned a tidal variation of about 20 feet.

The boom, 80 feet long, is shown in Fig. 1 in its working position, standing at an angle a little over 30 degrees from the horizontal. It is required that the outer end should stand at sufficient height to carry loads over the decks of the largest vessels at high tide, while the other end must be low enough to project inside of the warehouse door.

The boom may be raised to the position shown in Fig. 2, carrying the outer end clear of all parts of vessels and withdrawing the inner end from the warehouse. With it in this position, vessels may be docked and the cranes placed opposite the various hatchways in proper position for loading or discharging cargoes.

The main frame, or tower, is of steel construction and stands 62 feet above the track. There is a clear opening through it 10 feet wide, in which the boom is suspended and through which the loads are carried. The base is so constructed that the crane can travel over freight piled to a height of 6 feet between the tracks, and so that goods may be trucked directly from under the crane to the warehouse. The space between the front of the warehouse and the edge of the wharf was sufficient for a track of only 11 feet gage. This, together with the necessary height and reach, made the question of stability a serious one. Although the weight of the frame and machinery has been so disposed that the crane will be stable with a load 25 per cent above normal capacity in the extreme position, clamps have been provided which are always in engagement with the rear rail, to prevent the crane from tipping if a load should become fouled on a hatchway or other part of the vessel.

The crane is mounted on six wheels, four under the front and two under the rear. Anticipating the possibility of uneven settling of the wooden

wharf, the wheels are carried in equalizers, so arranged as to compensate for any probable irregularities of track without straining the structure.

The machinery for the various movements, is placed in the base of the tower, adding to the stability of the crane, and giving easy access for inspection. For convenience in shipping and erecting, each set of machinery is mounted upon a separate frame, which is easily handled and put in place.

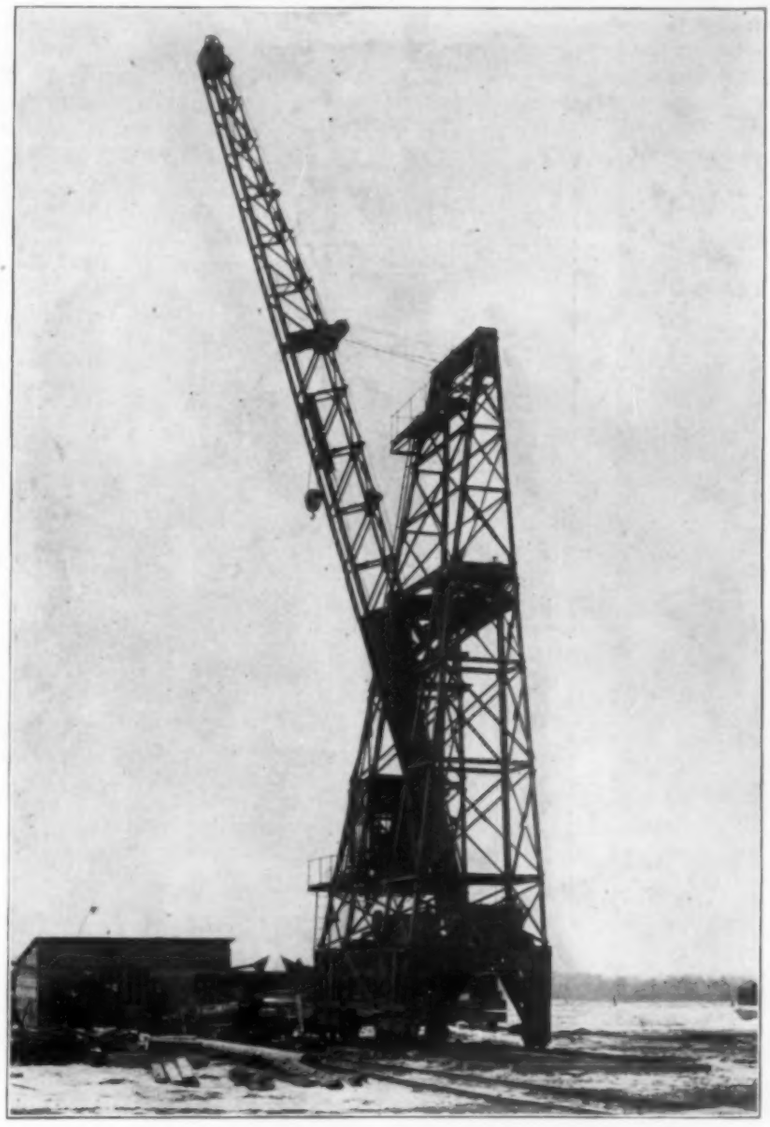

FIG. 2.—ELECTRIC UNLOADING CRANE FOR PANAMA—BOOM RAISED FOR MOVING.

The crane has a regular working capacity of four tons, and a reach of 40 feet from the center line between rails to the extreme outer position of load. The total height of hoist is 70 feet, and the speed of hoisting with full load is 150 feet per minute. The load can also be racked out and up at a speed of 150 feet per minute. The other two movements, travel and boom hoist, are relatively slow, being required only in setting the crane in position for service.

The hoist is operated by a 65-horsepower motor, the rack motion by a 40-horsepower and the travel and boom hoist by 24-horsepower and 8-horsepower motors respectively. Automatic switches are provided to prevent overtravel in hoisting and racking out, also an overload switch for the hoist machinery. All movements are under the control of one operator, whose cab is so located as to give him the best view of his work.

The crane weighs nearly 50 tons, and with the boom in the raised position as shown in Fig. 2, it stands 90 feet above the wharf.

The motors and controllers, as well as all structural work and machinery, are the product of the Shaw Electric Co.'s plant at Muskegon.

## TO INSTALL CAR DUMPER.

The Wellman-Seaver-Morgan Co., Cleveland, has just closed a contract with the Tidewater Railway Co. for one Hulett patented stationary car dumper for its Sewell Point terminal, Norfolk, Va. This car dumper will handle the entire coal traffic of the Tidewater railway transferring it from cars to vessels. The method to be employed is entirely new as applied to this class of work. Coal arriving in 100,000-pound capacity steel cars from the mines will be run into the dumper which will transfer the coal into special steel hopper cars absolutely self-clearing and capable of quick dumping. These transfer cars, after leaving dumper, will be lifted by a powerful electric haulage up an incline on to the coal trestle. Each of these cars will be in charge of an operator and when arriving at a point over the hatch of the vessel, it will dump electrically and instantaneously, then drop by gravity to the end of the trestle, and run back to the car dumper for another filling, thus doing away entirely with hand shoveling from cars to vessels as at present. The plant will have a capacity for handling 1,500 tons per hour and is to be in operation May 1, 1908.

## AUSTRALIA'S MACHINERY.

Consul-General John P. Bray, of Melbourne, reports that British metal goods and machinery show substantial increases in their sales in Australia during the past year. The principal articles of metal goods imported during 1906 amounted in valuation to $16,479,695, against $12,624,280 in 1905. By articles the imports included the following: Pig iron 49,223 tons in 1906, against 34,085 in 1905; iron bars, rods, etc., 26,455 tons in 1906 and 23,767 tons in 1905; rails, 26,046 in 1906 and 15,052 in 1905; wire products 20,742 tons in 1906 and 14,892 tons in 1905; galvanized iron, 60,883 tons in 1906 and 54,394 tons in 1905; tin plates, 16,159 tons in 1906 and 17,449 tons in 1905; tubes, pipes, etc., 20,873 tons in 1906 and 17,360 tons in 1905; nails, screws and rivets, 3,235 tons in 1906 and 2,423 tons in 1905. Exports of machinery from England to Australia exclusive of electrical machinery increased from $3,341,975 in 1905 to $4,546,123 in 1906.

**Making Vanadium Steel.**—The United Steel Co., Canton, O., is now making vanadium steel for commercial purposes in its 50-ton basic furnaces. Recently the company made a heat of about 30 tons, which it believes is the largest that has ever been made in this or any foreign country.

# THE MANUFACTURE OF STEEL BATH TUBS.

## A New Line of Powerful Machinery.

In the accompanying illustrations is shown a complete equipment consisting of presses and dies designed and built by the Toledo Machine & Tool Co., of Toledo, O., for producing seamless stamped steel bath tubs. The seamless stamped steel bath tub is the largest drawn or deep stamped work yet produced in this country by the toggle press method.

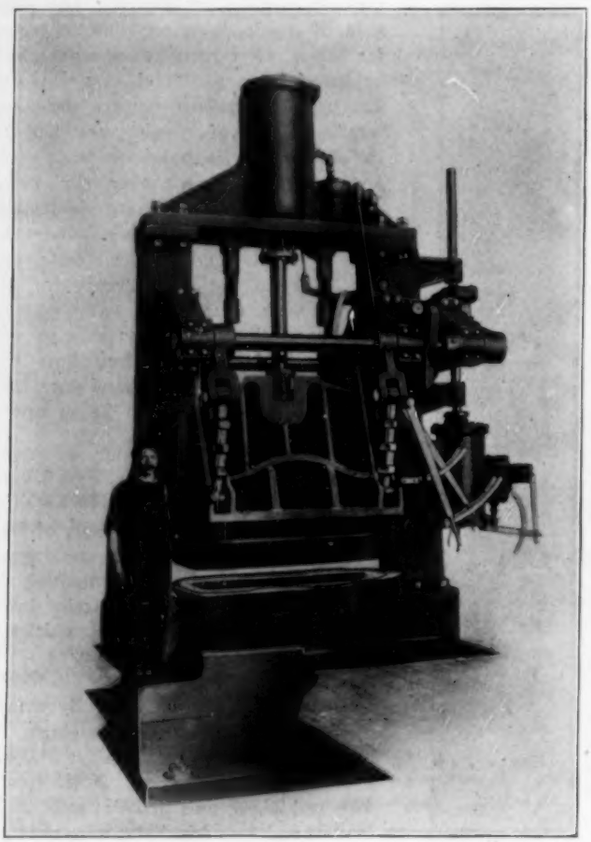

FIG. 1.—STEAM ACTUATED PRESS FOR FORMING STEEL BATH TUBS.

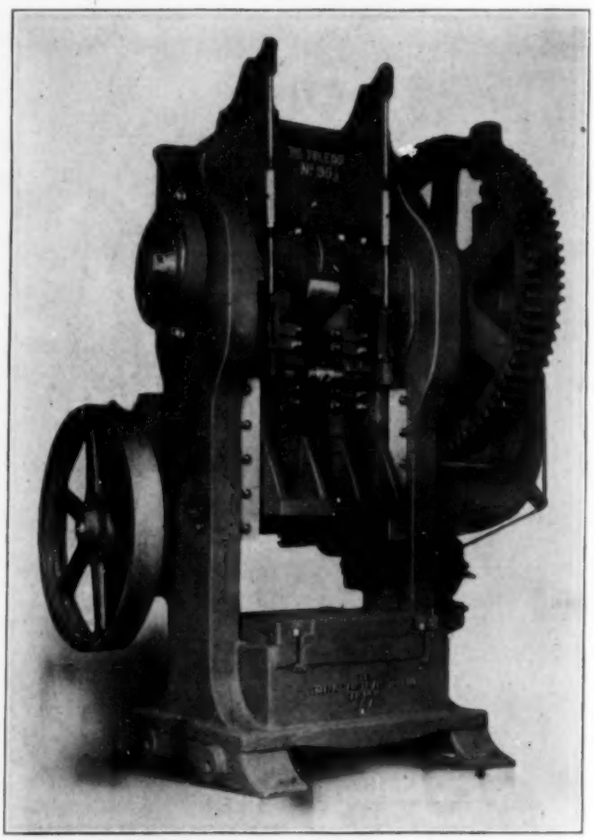

FIG. 2.—TRIMMING PRESS FOR STEEL BATH TUBS.

Another novel feature of this new method is that the shell or stamping is produced cold in three operations. The stamping is annealed but once during the process of completion and this annealing is required only to restore ductility to the rim to prevent the possibility of fracture when trimming and forming in the third operation.

The drawing dies and attachments for this work are designed to give the metal the greatest protection possible to prevent the forming of wrinkles or buckles in the sheet, in consequence of which the ordinary market grade of metal only is required in making these stampings which are produced so smooth and free from wrinkles that the expensive spinning or ironing processes are unnecessary. The entire time required to complete the three operations in making the tub stamping is not more than three minutes. The machine or hammer shown in Fig. 1 while large, is of much less weight because of its special construction than would be required in the other form of toggle drawing presses now in use for smaller work of a similar nature.

This machine, of new design, is fitted with two steam cylinders distinctly separate in their functions. The smaller of the two cylinders, which is located on the right hand side of the machine, operates and controls the blank holder. The blank holder has a vertical movement of 19 inches and is controlled by a toggle at each of the four corners, the combined pressure of which is estimated to be approximately 1,400 tons. Two of these toggles are attached to each of two horizontal shafts running from right to left on the front and rear side of the machine. These shafts are connected on the outside of the housings on the right hand side of the machine, by means of powerful bell cranks and links, to the piston shaft of the small cylinder previously referred to. The blank holder is elevated up or down and securely locked at will of the operator independent of other movements of the machine.

The main cylinder for operating the forming plunger is 28 inches diameter and of sufficient length to give the plunger a stroke of 50 inches. This piston shaft is attached to a steel cross head or ram weighing about 6,000 pounds, and this with the male forming die which is keyed to the cross head gives a falling weight of about 20,000 pounds.

The base or anvil of machine is made in three sections the combined weight of which is about 90,000 pounds.

The main arch and cylinder and the two housings or uprights are bolted together on the base and reinforced by four steel rods passing entirely through the base housings and arch and shrunk in position.

The dies used for drawing the tub consist of a female die made adjustable for three sizes or lengths, a male die or forming punch for each size which is keyed to the cross head and a pressure plate for each size which is securely bolted to the blank holder. The special design and construction of the dies prevent absolutely the buckling or wrinkling of the sheet being worked, as previously mentioned.

The actual time required to draw the tub in either the first or second operation is less than 40 seconds after the blank has been placed in position. About the same length of time is required to place the blank or sheet in position and remove the tub or stamping from the dies when finished.

The lower die is fitted with an automatic knock out operated from the blank holder for ejecting the stamping from the dies when completed. The operation of producing the stamping consists in first placing a plain squared sheet of steel (⅛ inch thick) in position in the die. The operator then brings the small cylinder into operation bringing the blank holder and pressure plate to bear on the sheet. The blank holder remains at rest and is automatically located with the required pressure on the sheet to prevent wrinkling or buckling of the sheet. The operator next brings the larger cylinder into operation forcing the forming plunger onto the sheet and forming the stamping to a depth of about 12½ inches, which completes the first operation on the stamping as shown in Fig. 3. The stamping is next lifted from the die, all operations having required not more than 1½ minutes.

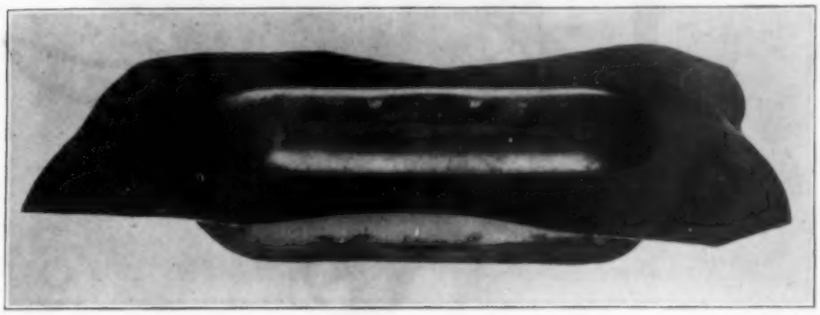

FIG. 3.—STEEL BATH TUB—FIRST OPERATION.

The next operation is to anneal the stamping and pickle it to remove the scale. It is then again placed in position in the dies (the first operation dies having been previously removed and the dies for the second operation placed in the machine) and the operation, with the blank holder pressure plate and forming plunger repeated, in this manner finishing the forming of stamping to a depth of 17½ inches, and a width and length of 24 inches and 60 inches as shown in Fig. 4. Less time is required for the second operation than for the first.

Some of the dimensions of this large press are as follows:

| | |
|---|---|
| Width between housings..... | 96 inches. |
| Width of bed..... | 96 inches. |
| Depth of bed..... | 60 inches. |
| Height from bottom of base to top of cylinder..... | 23 feet. |
| Total weight of machine..... | 260,000 pounds. |

The stampings are now ready for the trimming press, Fig. 2, to which they are taken where the flange is trimmed and the curved rim forced, the two operations being completed at one stroke of the press. This latter press is of special design and size known as the "Toledo 84-inch" No. 96 double geared special.

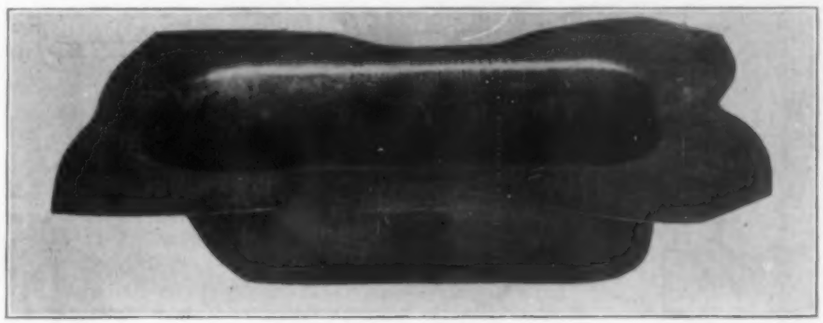

FIG. 4.—STEEL BATH TUB—SECOND OPERATION.

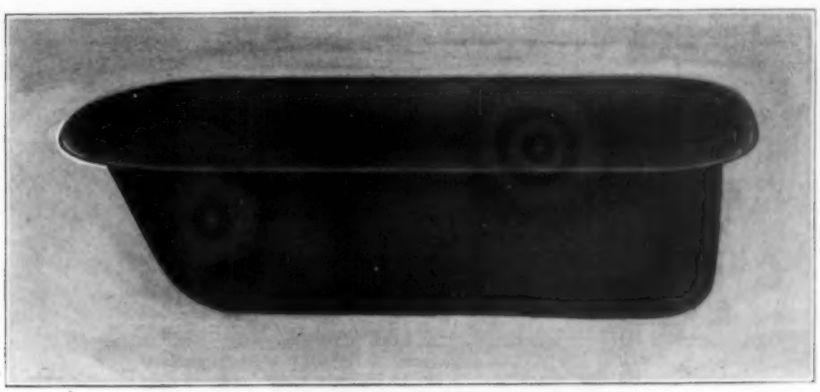

FIG. 5.—STEEL BATH TUB—COMPLETE.

This press is fitted with a special die holder or fixture with swinging open front. The lower trimming and forming dies are fitted to this fixture, the open front in the upper die meeting in the center and being securely and positively locked after stamping has been placed in position.

The stamping is then trimmed and the curved edge of rim formed, as previously stated, at one stroke as shown in Fig. 3. The dies are then unlocked and swung open and the stamping is quickly removed.

The slide of this press is fitted with a positive automatic knock out passing down through the upper die. As the slide lifts upward with the stroke of the press this knock out is brought into action stripping the work out of the upper die. The bed and special fixtures of the press are fitted with lower cam actuated automatic knock out which is timed to rise with the slide. This knock out is operated by

the cam on the left end of the crank shaft. This knock out receives the stamping as it is ejected from the upper dies and prevents it falling back into the lower die.

The time required for trimming and forming the rims is less than 1¼ minutes per tub. This equipment has actually trimmed and formed the rims of tubs at the rate of 48 tubs per hour.

Some of the dimensions of this press are as follows:

| | |
|---|---|
| Stroke | 6 inches. |
| Width between housings | 86 inches. |
| Width of bed | 84 inches. |
| Depth of bed | 48 inches. |
| Distance from bed to slide stroke and adjustment up | 36 inches. |
| Adjustment of slide | 4 inches. |
| Total weight of machine | 85,000 pounds. |

This press is fitted with machine cut gears and with three-engagement clutch with gravity releasing device.

Other special presses of the more ordinary smaller types are included with this equipment for punching holes for supply and overflow pipes, etc.

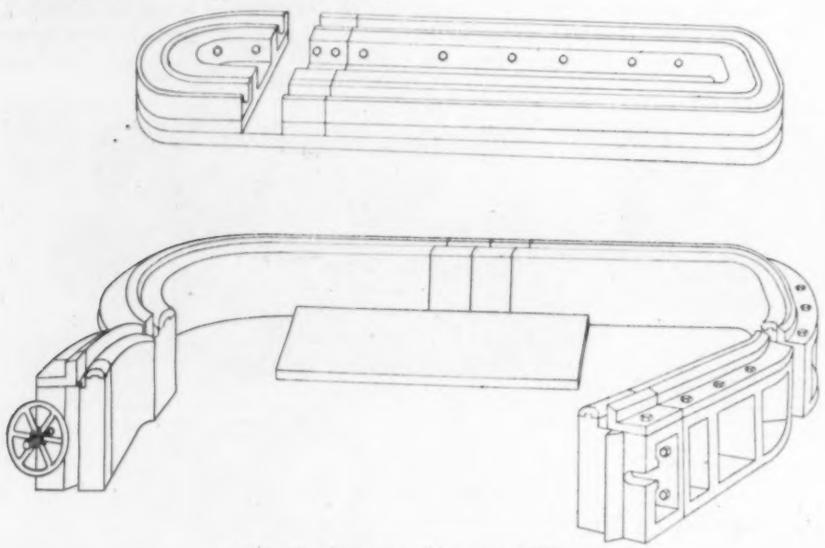

FIG. 6.—DIE FOR TRIMMING PRESS.

**Plant Damaged.**—Fire did $40,000 damage to the plant of the General Drop Forge Co., at Buffalo, May 27. About $8,000 damage was done to the building and the balance of the loss was to machinery and appliances. The origin is a mystery. The buildings were owned by the General Railway Signal Co., and until recently occupied by the Taylor Signal Co., which moved to Rochester.

The eastern sales offices of the Republic Iron & Steel Co. and the Tennessee Coal, Iron & Railway Co., together with the offices of President Topping and other executives, have been moved from 111 Broadway, New York, to more commodious quarters on the fifteenth floor of the adjoining building, 115 Broadway, which is just being completed.

FIG. 1.—PRIDMORE MOLDING MACHINE, PATTERN IN POSITION.

## PRIDMORE ROCK-OVER DROP MOLDING MACHINE.

For use in jobbing foundries, machinery and other specialty shops, requiring castings in comparatively small quantities, a rock-over drop molding machine has been designed and is being built by Henry E. Pridmore, Chicago.

The machine with the pattern in position ready for the flask is shown in Fig. 1, and in Fig. 2 the flask has been rammed, and clamped with the bottom board to the pattern frame. Fig. 3 shows the flask rolled over, and in Fig. 4, the clamping rod has been released and the mold dropped away from the pattern. Fig. 5 shows the flask raised in position to be lifted off and the pattern rocked back for the next mold. In a machine of this type the accuracy and efficiency of the adjustable table is the most important feature. The table, as

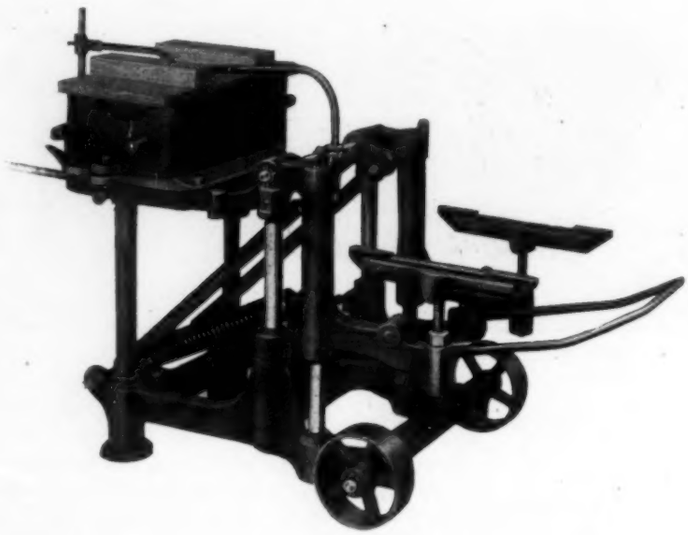

FIG. 2.—FLASK RAMMED.

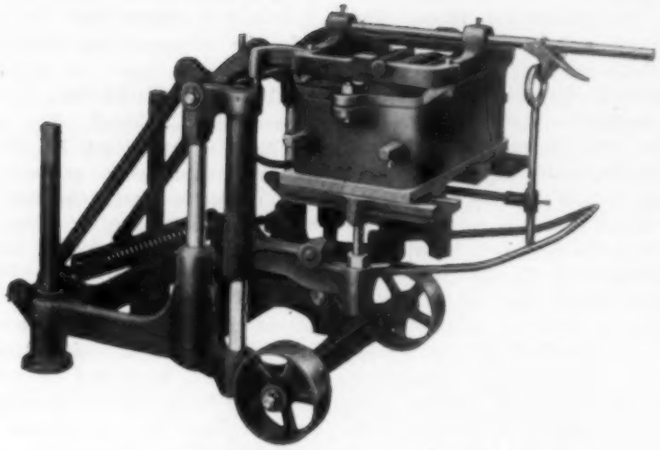

FIG. 3.—FLASK ROLLED OVER.

shown by the different positions it assumes in Figs. 2 and 5, travels vertically on parallel steel uprights on which there is practically no wear, as the weight of the flask and mold is supported by centrally located rocker arms, counterbalanced by springs, whose tension can be regulated as the weight of the flasks and molds varies.

The rests for the flask are constructed and fitted to the machine in such a way that they can be adjusted automatically to flasks of different depths, to irregular bottom boards and to the variation in the thickness of the bottom boards and the depth of the flasks.

The clamping rod can be adjusted to flasks of different sizes, and is so designed that one movement firmly clamps the bottom board and flask to the rock-over frame in such a way that it is impossible for either the board or the flask to shift while being rocked over. The rocking operation is facilitated by springs which can be adjusted to the variations of the work.

The machines are built in four sizes, as follows: 19 x 18 inches with 6 or 8-inch drop; 29 x 24 inches with 8-inch drop; 29 x 24 inches with 12-inch drop; 19 x 36 inches with 6 or 8-inch drop. The first dimension of each size indicates the extreme outside width of the flask which the machine will accommodate, and the second dimension refers to the distance between the flask rests, beyond which the flasks can extend lengthwise 12 to 14 inches at each end.

The machines are now being successfully used for molding grate bars, pulleys, fly wheels, piston rings, hangers, hanger boxes, couplings, bells, etc., and the saving effected over the former methods of molding ranges from 30 to 90 per cent.

In addition to this type, this concern builds stripping plate and regular rock-over machines. The latter is used for molding patterns having sufficient draft to permit them to be rocked out without breaking the mold.

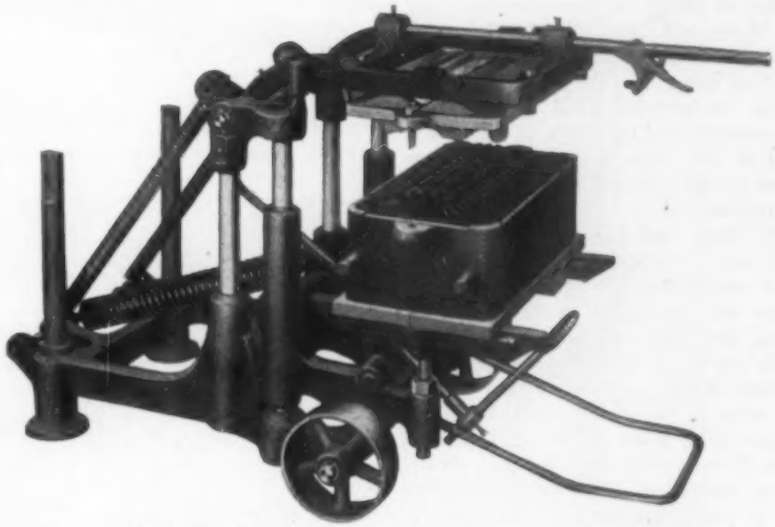

FIG. 4.—CLAMPING ROD RELEASED, MOLD DROPPED AWAY FROM PATTERN.

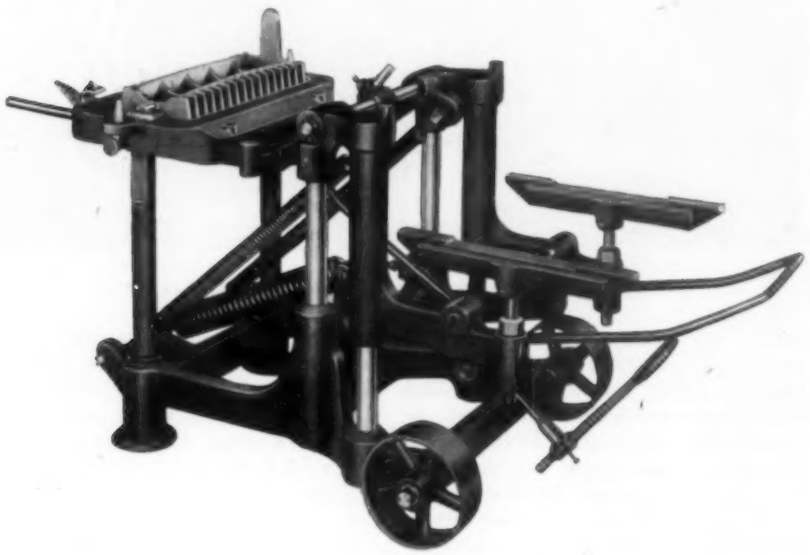

FIG. 5.—FLASK IN POSITION TO BE LIFTED OFF AND PATTERN ROCKED BACK FOR NEXT MOLD.

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The danger of a strike of structural iron workers which would have seriously affected the building trade of Toronto, has been averted by a compromise. The members of the structural iron workers' union demanded an increase of wages from 30 cents to 35c per hour. The employers offered 32½c and on the 7th inst. an agreement was arrived at on that basis, to hold good for one year. The machinists' union has notified the employers that when the present agreement expires on June 16, they will demand an increase of 15 per cent upon the wages of 20c per hour as fixed by the agreement. As most of the men are now being paid 22c, a settlement will probably be effected.

# BOOK REVIEWS.

**The Corrosion and Protection of Metals.** By A. Humboldt Sexton, F. I. C., F. C. S. Manchester. The Scientific Publishing Co. 5 x 7¼ inches. 132 pages. Cloth. Supplied by THE IRON TRADE REVIEW for $1.25, postage and duty extra.[1]

The subject of the corrosion and protection of metals is of such extreme importance that no engineer can afford to neglect it but yet the literature on the subject is extremely scanty. The author of this little book claims to have spent a great deal of labor in preparing it, including the making of a large number of experiments. It is by no means a complete treatise but rather a preliminary study of the subject. The chapter headings are as follows: Rusting of Iron and Steel; Protection of Iron and Steel from Atmospheric Corrosion; Corrosion of Metals by Corrosive Gases and by Water and Other Liquids; Corrosion of Iron and Steel and Copper and Brass by Sea Water.

The engineer interested in the subject of corrosion and protection of metals will find in this book in a condensed form most of the interesting and valuable information that is available on the subject. Many useful hints concerning oils and paints are included in it. The author enumerates the several qualifications that protective coverings should have, and then states that no known material has all of these qualifications in the highest degree, some which possess one or more of the qualifications in a high degree being lower in others. The selection in any particular case will usually be of the nature of a compromise. This is a fair statement of the existing state of facts in regard to protective coverings. It is a very troublesome state of things, of course, that the engineer has no single material which can be relied on in all cases and under all circumstances to protect iron from corrosion, but a clear statement of the qualities and of the imperfections of the different remedies is of great service.

We commend the book to all those interested in the subject.

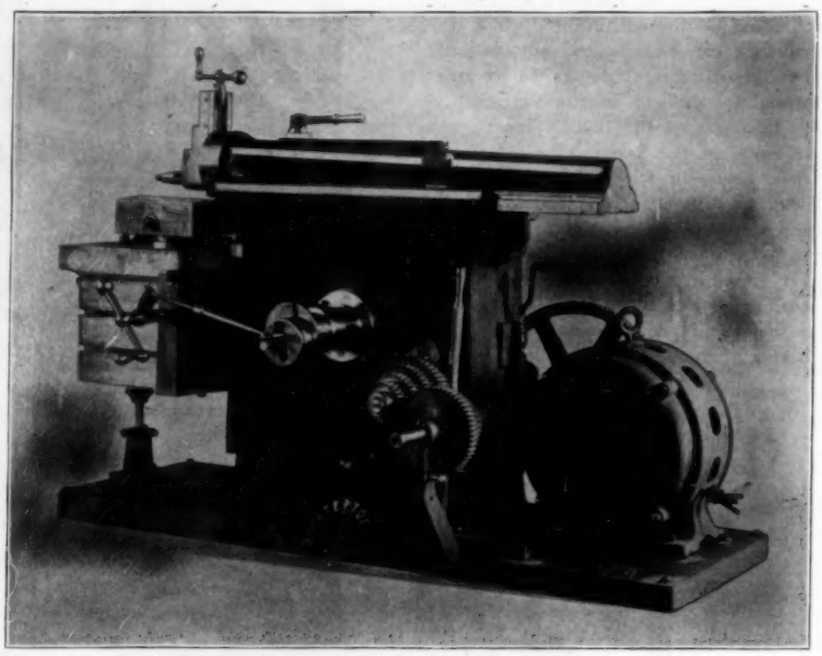
**How Money is Made in Security Investments,** by Henry Hall. New York. Published by the author. 5¾ x 8¼ inches. 235 pages. Illustrated with charts. Cloth. Supplied by THE IRON TRADE REVIEW for $1.50.

The book is the product of an old newspaper man, Mr. Hall having formerly been an editor and business manager of the *New York Tribune,* and the work is stated to be the result of a careful and minute examination of Wall street movements and phenomena. Its declared purpose is to enable the investor of moderate means to judge for himself the proper time to buy and sell securities, by presenting before him the factors that are constantly besetting the market, and the average conduct of price movements at certain times of the year and under certain conditions, as deduced from many years' operations. In the respect that it attempts to counsel investors to judge and look for the real value of securities in this age of inflated price levels, and to base their calculations of return upon this fundamental fact, the book fills a worthy mission for the average sober-thinking man. If the rather alluring prospect of a "fortune at fifty-five" as the ultimate result of following the certain course of action outlined, be disregarded and the author's premises and generalizations be studied for their worth in themselves, the book ought to be considered in the light of an effective aid in disciplining the impetuous investor and in fostering a more conservative consideration of the relation of risks to the possibilities of success in a stock venture. Taken as a whole, the subject, which may be regarded as a very precarious one, is handled fairly conservatively. The book possesses historic value, even for the non-investing public, in its tracing the cycles of prosperity and depression through the country's history and in its treatment of the career of certain stocks. It also contains interesting information of Wall street operations generally.

[1]This book is not in stock, and must be imported. About three weeks must be allowed after receipt of order.

## A MOTOR-DRIVEN CRANK SHAPER.

In the accompanying illustration is shown a new type of motor-driven crank shaper built by the John Steptoe Shaper Co., Cincinnati. The machines are built in three sizes, 16, 20 and 25-inch and either plain or back geared. The motor is direct-connected to the machine by means of a pinion on the motor shaft meshing with a large gear shown on the opposite side of the column. The shaft of this gear extends across the back of the column to the speed box, which is equipped with four sets of gears supported by exceptionally long bearings, giving great rigidity and long life. By means of this gear box, quick changes of speed may be obtained by operating the lever shown behind the speed box, the lever operating a clutch which engages or releases the different gears. The lever shown at the back of the column operates the back gearing, giving a total of eight changes of speed to each length of stroke. In practice, the speed box is covered, the cover having been removed for photographing.



STEPTOE MOTOR-DRIVEN, BACK-GEARED, CRANK SHAPER.

This tool is also equipped with a power down feed of simple construction and operated by the friction box shown in the rear, which controls the down feed screw by means of a suitable ratchet and bevel gearing. A support for the table is also provided with this machine, the support having a roller at the top which travels over a planed surface, thus permitting the taking of exceptionally

heavy cuts without springing the table and insuring a high degree of accuracy under severe strain.

## DOCK IMPROVEMENTS.

The Pennsylvania road is rapidly completing improvements at Ashtabula, Ohio, to facilitate the great lakes ore traffic. The work includes the building of two new docks, each 1,120 x 740 feet of concrete set on cribbing; the widening of the channel of the river 60 feet to admit the largest lake steamers; the installing of six new ore handling machines, which will more than double the lines' former capacity; an ore handling bridge of 800 feet length, with a traveling space of 800 feet up and down the dock; two new car dumpers for coal shipments; a breakwater 1,800 feet long and a big power plant. The work was begun less than two years ago, and its cost is estimated at $3,000,000.

About 100 union iron molders and core makers are now on strike at the Bass Foundry & Machine Co., Ft. Wayne, Ind., because the company had refused to recognize certain union restrictions.

A. O. Espe, Cookston, Minn., foundryman, is having plans prepared for an addition 75 x 140 feet two stories.

## A MOTOR-DRIVEN BOILER SHELL DRILL.

Figs. 1 and 2 illustrate a new boiler shell drill built by the Thomas H. Dallett Co., Philadelphia. The machine is motor-driven throughout, and has been designed to use of high speed steel. It comprises two end housings on the front face of which are carried by means of brackets two 5-inch bars. On these bars are mounted independent motor-driven drill heads carrying the drill spindle, motor, controller and switch. The bars, drill heads, motors, etc., are counterbalanced and are raised and lowered by means of screws driven by a motor on top of the housing. This motor is controlled by means of a reversible controller box mounted on the inside of the housing, but not visible in the illustration. A feature of the machine to which the maker calls particular attention is the central position of the spindle between the bearings of the drill heads on the bars and between the bars themselves. Owing to this construction, the pressure of the drill against the work has no tendency to set up torsional or sidewise strains in the drill heads or bearings, thus causing excessive friction of the drill in the hole, rapid wear of the drill and undue consumption of power, owing to the spindle being thrown out of alignment. The machine is self-contained and all adjustments are made by means of crank handles and hand wheels. All adjustments of the drill head are at the command of the operator from any position.

The length of the standard machine over all is 17 feet 8 inches; the height is 11 feet 6 inches, and the total weight is 12,000 pounds. In the lowest position of the carriage, the centers of the spindles are 21 inches from the floor, and the spindles have a possible vertical movement of 5 feet 9 inches. The housings are 14 feet apart and the spindle centers can be separated a total distance of 12 feet. The spindle speeds range from 80 to 160 revolutions per minute. The drills are driven by means of a 2-horsepower, variable speed motor on each drill head, the controller and switch being mounted on the side of the motor. Each drill head has an individual, vertical adjustment in itself of 6 inches, which motion is effected by means of a crank handle at the bottom. The drill head may be moved along the bars by means of a pinion and rack on the under side of the lower bar.

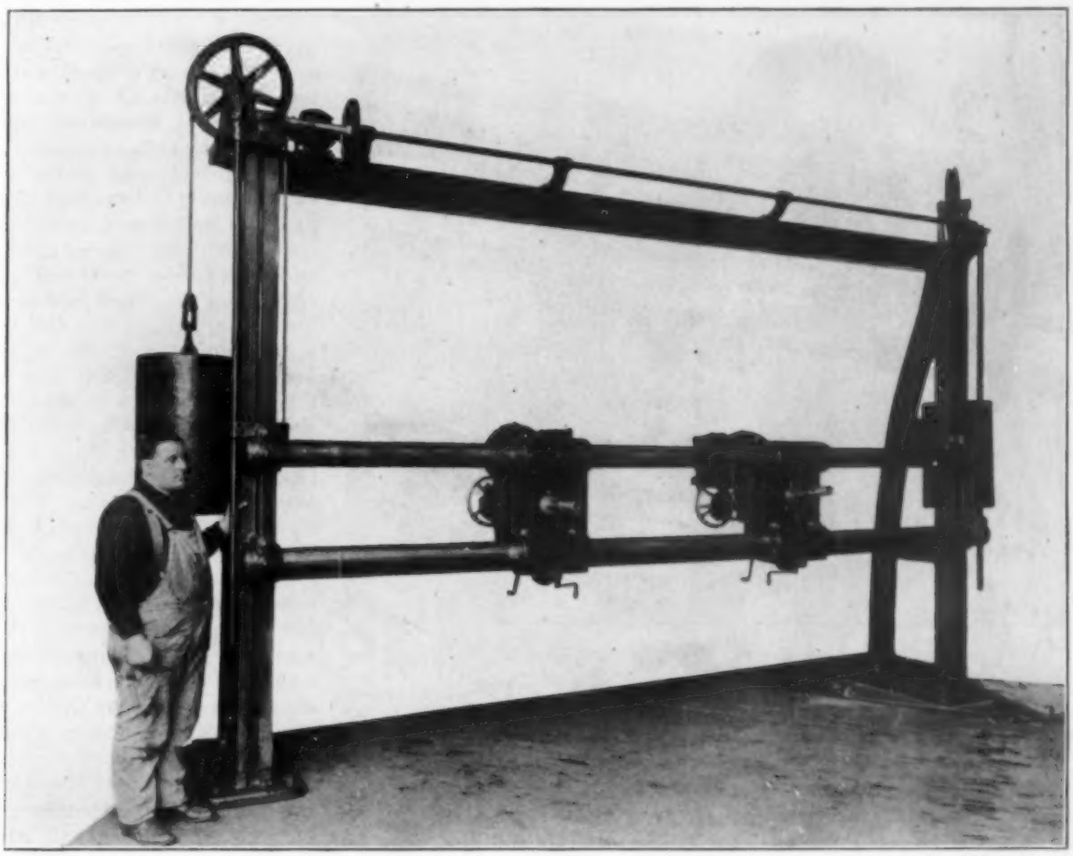


FIG. 1.—DALLET MOTOR-DRIVEN BOILER SHELL DRILL.

The diameter of the spindle is 1 13-16 inches, and it has a traverse of 18 inches and a perpendicular range through an arc of 15 degrees, permitting the drilling of rivet holes radially to the center of the boiler, which should be set on rollers in front of the machine. The spindles are drilled for No. 4 Morse taper. The feeding mechanism can be set for any desired pressure of feed, which cannot be exceeded. Change of feed is effected simply, and a range of from 0.005-inch per revolution of spindle to 1-16-inch

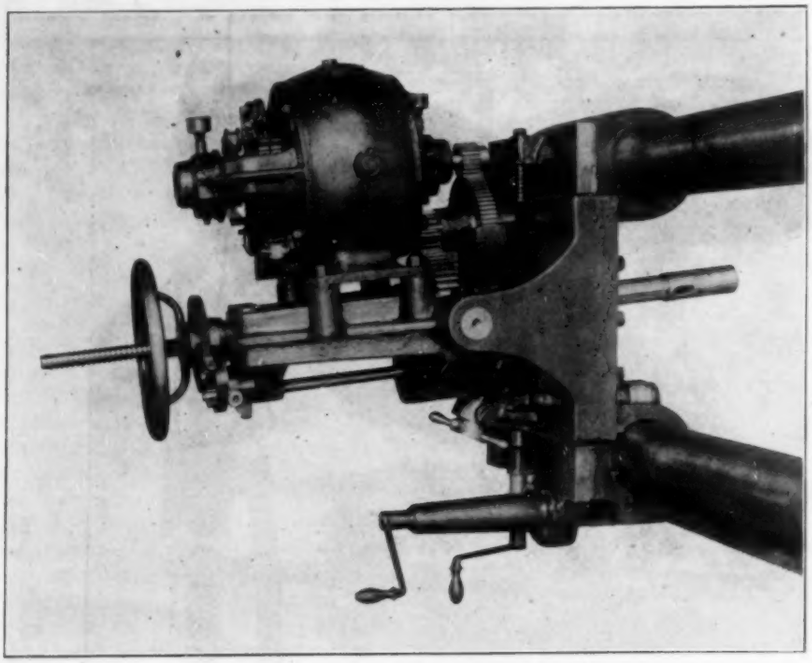


FIG. 2.—HEAD OF DALLET BOILER SHELL DRILL.

can be obtained, which covers all the requirements of drilling and boiler work.

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The F. E. Reed Co., Worcester, Mass., has planned to erect an addition to its works this spring. It will be 130 feet x 83 feet, three stories with basement, brick construction, and to be used for storage and manufacturing. It will face on Lamartine street, paralleling the Lamartine street building and connected to same by a bridge, running from two different stories. The new building will be joined to the present "power house" building, erected in 1899. The company has long felt the need of the proposed new addition.

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The new brass castings foundry erected by the Monarch Mfg. Co., Columbus, O., has been put in operation. The company now has facilities for making over 100 of its water motors a day in addition to other specialties.

## MARKED ANXIETY

### For Orders Shown by British Bar Makers.—News of Kingdom.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., May 22.

Although there is a decided boom in the iron trade, its condition leaves a good deal to be desired by the Midland ironmaster. Pig iron is bounding upwards, but finished iron is much more sober and staid in its progress, and in certain departments there are even signs of retrogression. South Staffordshire, as usual, is behind other districts in unmarked bars, Lancashire and North Staffordshire having both intimated their readiness to add another 10s to the price if the Black country will follow suit but bar makers here are still scrambling for orders, and £7 10s, the recognized standard, is really only a nominal figure. Organization was never more badly needed, but it cannot be said that the Unmarked Bar Association commands any confidence. It is very likely that strip will be advanced this week, and sheets are about half a crown dearer. Generally speaking, the works are fairly well occupied. Galvanized varieties are showing increased firmness. The board of trade returns for April show an export of 39,572 tons, against 33,764 a year ago, although the latter figure was at that time regarded as a phenomenal output.

The amalgamation of the Metropolitan Amalgamated Carriage & Wagon Co., Birmingham, with the firm of Messrs. Docker Bros., has been consummated.

Among the important firms which have just issued reports are those of John Lysaght, of Newport, and William Roberts, Tipton. The first named firm shows an improvement in profit for the year of over £35,000, bringing the total surplus to £171,200. The dividend increased a year ago from 10 per cent to 12½ per cent is further raised to 15 per cent, while £50,000 is added to reserve, bringing the total to £260,000, or about 57 per cent on the company's share capital. The second firm, William Roberts, Tipton, has a handsome trading profit of £20,827, and after providing for all preference demands, there is a sum, for distribution equal to nearly 49 per cent on the ordinary capital. The directors pay a 10 per cent dividend, and an additional bonus of a similar amount.

**Leading Ironmaster Dies.**

One of our greatest captains of industry has passed away in the person of Sir Alexander Wilson, Bart, chairman of Charles Cammell & Co. of the Cyclops Iron Works. As a young man he represented the firm in the United States, and after filling important positions in the Sheffield works was in 1885 appointed managing director. When he joined the works, there were not more than 500 employes, and it was his influence largely which increased the number to over 10,000 men. Perceiving that the heavy machinery alone was needed to produce armor plates, practically of any thickness, he introduced this branch, which has had a great run of success. He was also instrumental in the establishment of rail mills at Workington capable of turning out 6,000 tons of rails per week. A large number of social distinctions were showered upon him, his baronetcy being a sequel to a visit to the Cyclops works by Her late Majesty Queen Victoria with the Duke of Norfolk.

For some time past, the Home Office has had under consideration a request to apply to the iron and steel trades the system already existing in the coal trade of appointing a clerk weigher on behalf of the men to ascertain the weight of iron produced, and Mr. Gladstone has just announced the formation of a committee to consider the matter.

The renewal of the German syndicate has had a marked effect upon the steel trade, and no doubt is entertained that prices will steadily advance. Already there has been a great increase of firmness, and an increase of demand which has made bars and billets much more difficult to obtain than they were a month ago. The steel trade has been on the whole steady for some time past.

Much satisfaction has been given to local railway builders by the news that the Indian government is about to spend three and a half millions sterling in railway extensions and equipment.

## MESTA ENGINE FOR BETHLEHEM STEEL CO. RAIL MILL.

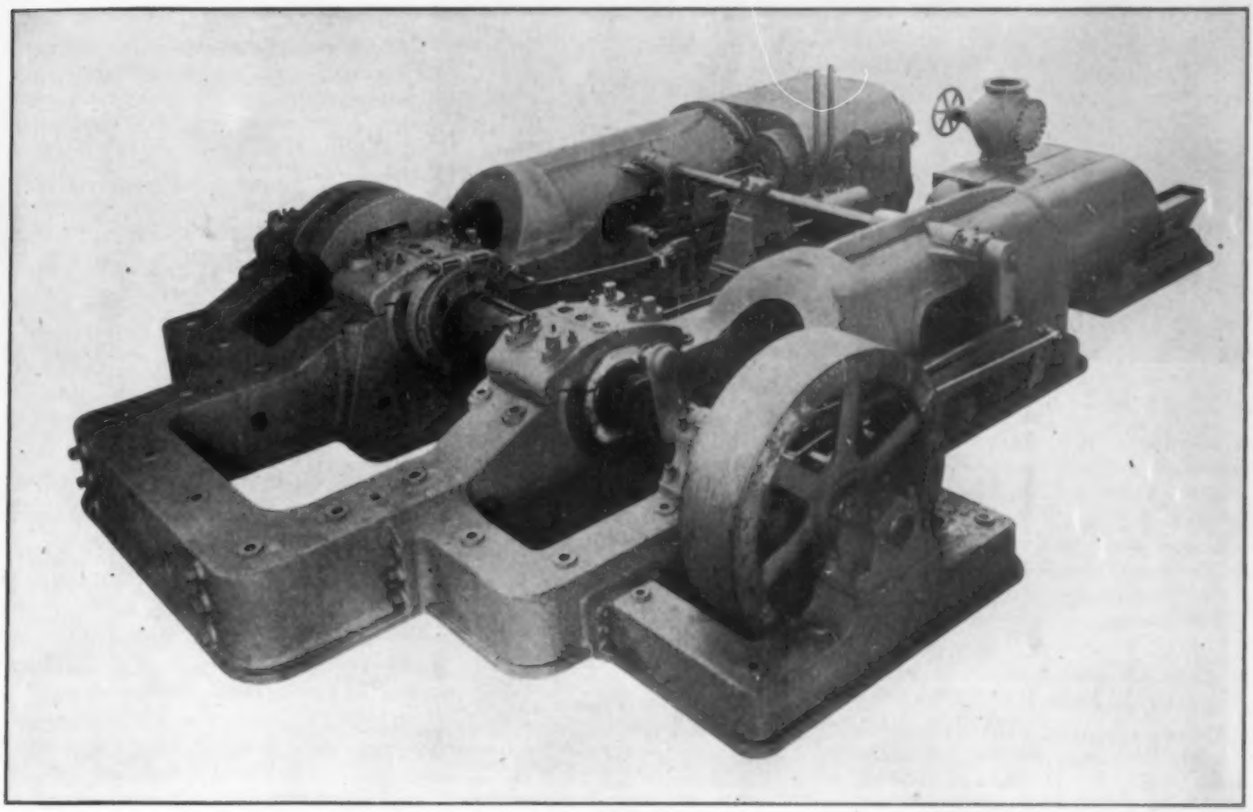
The illustrations shown herewith show a cross compound condensing piston valve engine recently built by the Mesta Machine Co., Pittsburg, for driving the finishing rolls of the rail mill at the plant of the Bethlehem Steel Co., South Bethlehem, Pa.

The engine is notable for its size compared with others of its kind. The high pressure cylinder is 44 inches diameter, the low pressure cylinder 76 inches diameter, 60-inch stroke. The steam pressure is 150 pounds, and the speed 80 revolutions per minute. The crank shaft is a single steel forging 26 feet long having a return crank near one end cut from the solid and provision made at the other end for a cast steel disc crank with inserted forged steel pin. The disc crank is driven by the high pressure cylinder and the return crank by the low pressure cylinder.

The bed plates are massive, each being made in a single piece. The high pressure bed plate has a single bearing for the shaft and the low pressure bed plate has two bearings for the shaft with a space for the return crank between. All bearings are 26 inches diameter, 46 inches long. Each bearing is provided with a flat bottom lower shell, two side bearings with adjusting wedges and bolts and a very heavy cap. The lower shell for the outside bearing next to the mill is carried on wedges to permit of its being adjusted vertically. A view is given of the low pressure bed plate loaded on the car, ready for shipping. Owing to its extreme width, it was necessary to set the bed plate on its side and let it down into the pocket of a special car furnished for the purpose. The total length of this bed plate is 29 feet 3 inches, the width 11 feet 8 inches, and the height 9 feet 9 inches. The finished weight is 201,000 pounds. In making the casting it required 220,000 pounds of metal, the entire capacity of six air furnaces, to fill the mold. The high pressure bed plate weighs 160,000 pounds.

The cylinders are made of a special mixture of charcoal iron and are equipped with piston valves for distributing the steam. The low pressure cylinder has double steam chests and two sets of valves for reducing the clearance; the high pressure cylinder has a single set of valves. Each set of valves consists of a main valve having a constant port opening and closure and a valve within it actuated by the governor to give a cut-off from 0 to 0.7 of the stroke of cylinder. The inner or cut-off valves are double ported, giving large openings for the earliest cut-offs. The main valves work in removable bushings forced in the steam chests. The rocker arms, sliding heads for valve stems, etc., are all made of cast steel.

For "backing" the engine or operating it by hand, a very unique arrangement was provided. The eccentric rods instead of connecting to the pins in the rocker arms, as is the usual construction, are connected to a pin in a slotted link set alongside each of the rocker arms. These links are similar in construction to the ordinary reversing engine link and are carried by a trunnion formed on their lower end in lifting arms operated by a steam cylinder. When the lifting arms are down, the trunnion on the lower end of the link is concentric with the shaft in the rocker arms and the link vibrates with the rocker arm. When the steam is admitted to the reversing cylinder and the lifting arms are raised, the links bring the rockers to their central position and thereby bring the main valves over the ports which lead to the cylinders, closing the connection between the cylinder and steam chest. The operator then takes hold of a lever or crank carried on a stand in between the two cylinders and by turning it to follow the high pressure crank pin, admits steam at the proper time to both the high and low pressure cylinders through valves with stems connected to this crank, thereby

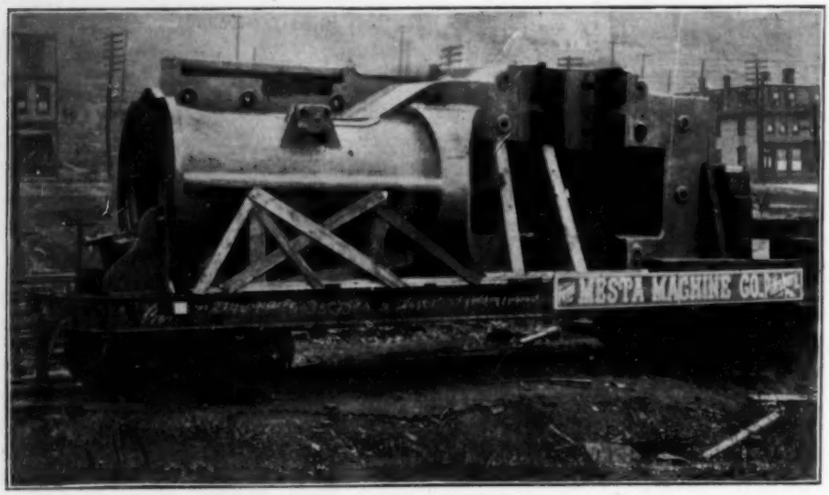


MESTA ENGINE FOR THE BETHLEHEM STEEL CO.'S RAIL MILL.

causing the engine to turn in either direction, as desired.

The shaft governor is 9 feet diameter and is driven from the high pressure crank pin by a drag link. The cut-off valves for both the high and low pressure cylinders are actuated by the governor.

The fly wheel for this engine is 22 feet diameter and weighs 200,000 pounds.



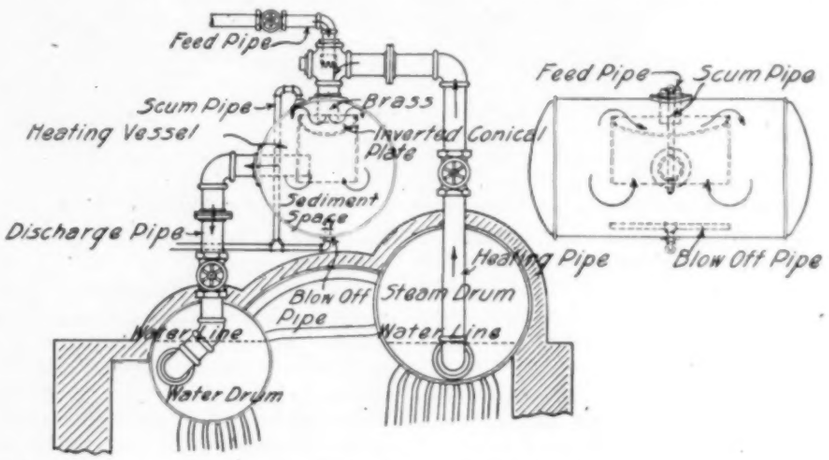

ENGINE READY FOR SHIPPING.

It is made in four segments with two arms each and two hub castings. The photograph does not show the fly wheel or crank disc on the shaft. The crosshead and connecting rods were not in place when this photograph was taken.

The total weight of the engine is 1,050,000 pounds.

## A BOILER FEED-WATER PURIFIER AND HEATER.

The accompanying illustration shows a boiler feed-water purifier and heater devised by J. N. Barnum, 1470 E. Ninety-third street, Cleveland. It is designed to raise the feed water to, or nearly to, the temperature of the water in the boiler and to remove therefrom all solid impurities, as mud and organic matter and also such impurities dissolved in the water, which may be precipitated by heat at a temperature not exceeding that of the water in the boiler. As shown, it comprises a tank about 4 feet in diameter and of any desired length with a vessel suspended in the interior, the bottom of which is open and the top closed by a concave head. Water is led in through the feed pipe, and discharged in close proximity to the surface of this head. A heating pipe leads from the boiler and connects with the feed pipe by means of a cross, as shown. This heating pipe has a diameter preferably much greater than that of the feed pipe. Water leaving the feed pipe is met by steam from the heating pipe in such volume that its temperature is raised to about that of the water in the boiler. Such impurities in solution in the water as can be precipitated out by heat are thus removed and fall to the bottom of the drum, together with any mud or other solid matter that may be held in suspension. The water is removed from the drum to the boiler by means of the discharge pipe, which opens into a chamber suspended in the drum. The drum is made of such size as to permit of a low velocity of water through it, giving plenty of time for foreign matter to settle. The impurities can be removed from time to time by means of the blow-off pipe at the bottom of the drum. The device is shown as applied to a boiler of the Stirling type, although it may be used on any type of boiler.




THE BARNUM FEED WATER HEATER AND PURIFIER.

## SMALLER VOLUME

### Of Business is Noted in the Chicago Machinery Market.

Office of THE IRON TRADE REVIEW,
1362 Monadnock Block, June 4.

The general slackening of demand in all machinery lines apparent for several weeks continued during the past week. The decrease is regarded by machinery men as normal and not due to other than natural causes. By many it is hailed with relief because of the belief that it will enable manufacturers to catch up in their deliveries. The decrease has been gradual and there have been no sudden breaks. It began with the withdrawal from the market of the railroads. For some time the demands for small equipments and odd tools kept the market almost as crowded as it previously had been. The smaller inquiries dropped off slowly.

The volume of business is sufficient to keep the manufacturers busy, but will enable them to hurry up deliveries on machines ordered during the rush.

The railroads continue to keep out of the market and no large lists have been placed. Small purchases were made as needed.

In wood working machinery the same conditions existed. The volume of business was steady, but smaller than two months ago. Dealers expressed themselves satisfied. Second-hand machinery sold slightly better than last week.

The Miehle Printing Press Co., another company affected by the new Northwestern depot, has announced its intention of moving. Two buildings are being erected for the company between Fourteenth, Hastings, Robey and Lincoln streets. One building will front 500 feet and the other 446 feet with a depth of 122 feet, giving a ground area as large as any buildings in the city. The buildings are costing $350,000.

# Liquidation Continues to Depress Stocks.

Opening under a flood of urgent liquidation, which forced prices within a narrow margin of the low point touched in the March 14 panic, the market in stock securities during the week under review has continued the erratic tendency that has characterized its movement for the past month. So great a pressure was brought to bear in the week that the decline continued until within less than two points of the low mark of the year. Righting itself after the early break, the market moved toward a general recovery, but with a very irregular and uncertain gait, which at the close still left many severe and net losses among active securities. The persistent selling of stocks is believed to be based upon the urgent demand for liquid capital, as it is understood that large obligations incurred for subscriptions to new capital issues are being met with difficulty, owing to the lack of public demand for railroad securities and the conditions in the money market. Professional sentiment remains strongly bearish, as these operators profess to see nothing ahead but low prices. No improvement can be noted in public or investment buying, and the week's sharp break attracted but a small volume of "bargain buying." A decisive turn in the market is predicted by many to be close at hand. An important development of the week was the inauguration of the export movement of gold to France by engagements on Tuesday and Wednesday, and this was not calculated to allay apprehension, for although immediate conditions in the domestic money markets are easy, this situation is regarded as partly deceptive, owing to the high rates that corporations are obliged to pay for loans. The New York bank statement of the week was regarded as unfavorable, as a decrease of $2,906,425 in surplus reserve, due to an increase of $15,554,100 in deposits, was shown. An increase in cash of $982,100 was disclosed. The New York exchange trading fell away from the preceding week as transactions amounted to 3,012,900 shares, compared with 4,443,400 shares a week ago, and 1,994,400 shares the corresponding week in 1906. Call loans averaged 2 per cent, compared with 1¾ per cent last week and 4 per cent the same week in 1906, while 60 day loans, New York, remained this and last week at 3¾ per cent, against 4¼ per cent last year.

Continued dullness prevails in bonds. The transfers of the week aggregated in valuation $5,516,000, compared with $8,274,000 last week and $8,776,000 the corresponding week in 1906.

### Financial Notes.

The Minneapolis Steel & Machinery Co., has declared dividends of 6 per cent on the preferred stock and $2 a share on the common stock, payable June 29.

The aggregate of dividends and interest disbursements for June will be $75,498,946, which is considerably in excess of a year ago for the same month, according to the compilation of the *New York Commercial*. Of the June dividends the industrial corporations will pay $27,070,388.

The South Baltimore Steel Car & Foundry Co. is preparing to issue $250,000 of preferred stock and $125,000 of common stock to bring the total amount of capital outstanding to $1,500,00. About a year ago the stockholders authorized this increase, but at that time only one-half of the amount authorized was issued.

Since Jan. 1, according to the compilation of the *New York Journal of Commerce*, the enormous total of $846,206,900 of new securities has been authorized and $607,565,900 has been issued in the same period. Notes to the amount of $252,476,000 have been issued during the first four months of the current year, as well as $198,750,000 in bonds and $156,339,900 in stocks. Of the grand total, railroads have authorized $628,478,000 and issued $421,199,000 in capital increases and industrials $217,719,900 and $186,366,900, respectively.

## THE LEADING INDUSTRIAL SECURITIES.

| | Closing Quo. June 1 | Changes In Week | Date 1907 Ann. Meet. | Stock Outstanding | Dividend Basis | Dividend Last Paid | Dividend Date Last Div. Pay. |
|---|---|---|---|---|---|---|---|
| Allis-Chalmers | 9½ | — ⅜ | Sept. | 19,820,000 | | ..... | ..... |
| Allis-Chalmers pr | 27⅜ | + ⅛ | | 16,150,000 | 7 cum | ..... | Feb., 1904 |
| American Can | 5½ | + ¼ | Feb. | 41,233,300 | | ..... | ..... |
| Am. Can pr | 53 | —1 | | 41,233,300 | 7 cum | 5 Q. | Apr., 1907 |
| Am. Car and Fdy | 58⅝ | +2¼ | June 27 | 30,000,000 | | 2 Q. | Apr., 1907 |
| Am. Car and Fdy pr | 108 | — ⅛ | | 30,000,000 | 7 n. c. | 7 Q. | Apr 1907 |
| American Loc | 57 | — ⅝ | Oct. 5 | 25,000,000 | | 1¾ Q. | May, 1907 |
| American Loc. pr | 106½ | — ⅛ | | 24,100,000 | 7 cum | 1¾ Q. | Apr. 1907 |
| American Ship. | 72 | — ⅛ | Oct. 2 | 7,600,000 | 6 | 1 Q. | Mar. 1907 |
| American Ship. pr | 105 | ..... | | 7,900,000 | 7 n. c. | 1¾ Q. | Jan. 1907 |
| Am. Steel Foundries | 6⅜ | + ⅛ | Oct. 1 | 15,810,000 | | ..... | ..... |
| Am. Steel Foundries pr. | 35 | —1 | | 17,240,000 | 6 cum | ..... | Aug., 1904 |
| Barney & Smith | 65 | —5 | June 4 | 2,000,000 | 4 | 4 | Mar., 1907 |
| Barney & Smith pr | 138⅝ | ..... | | 2,500,000 | 8 cum | 8 Q. | Mar., 1907 |
| Bethlehem Steel | 10 | —1 | April 2 | 14 862,000 | | ..... | ..... |
| Bethlehem Steel pr | 40 | ..... | | 14,908,000 | 7 n. c. | 1¾ Q. | May, 1907 |
| Cambria Steel | 36⅜ | — ⅜ | Mar. 19 | 45,000,000* | 6 | 3 Q. | Feb., 1907 |
| Cambria Iron | 47 | — ¾ | | 8,468,000* | 4 | 48. A. | Apr., 1907 |
| Chicago Pneumatic Tool | 41 | — ½ | Feb 18 | 6,145,800 | 4 | 4 Q. | Apr., 1907 |
| Colorado Fuel | 28⅜ | — ⅜ | Oct. 21 | 30,122,000 | | ..... | Apr., 1903 |
| Crucible Steel | 8 | — ⅝ | Oct. 16 | 24,578,400 | | ..... | ..... |
| Crucible Steel pr | 68¾ | —1⅝ | | 24,436,500 | 7 cum | 6 | Mar., 1907 |
| Empire Steel | 10 | ..... | Feb. 27 | 2,281,400 | | ..... | ..... |
| Empire Steel pr | 50 | ..... | | 2,500,000 | 6 cum | 3 S. A. | July, 1906 |
| Fay & Egan | 100 | ..... | Feb. 19 | 1,000,000 | 6 | 1½ Q. | May, 1907 |
| Fay & Egan pr | 128½ | ..... | | 1,000,000 | 7 cum | 1¾ Q. | May, 1907 |
| General Electric | 139 | —1 | May 14 | 63,643,600 | 8 | 8 Q. | Apr., 1907 |
| Harbison-Walker | 10 | ..... | Jan. 21 | 18,000,000 | 6 | ..... | ..... |
| Harbison-Walker pr | 72 | —1 | | 9,600,000 | 6 cum | 6 Q. | Jan., 1907 |
| International Pump | 28 | ..... | June 4 | 17,762,500 | | 2 | Apr., 1905 |
| International Pump pr | 74¾ | + ¾ | | 11,350,000 | 6 cum | 6 Q. | May, 1907 |
| Lackawanna Steel | 55 | ..... | Mar. 13 | 34,971,400 | | ..... | ..... |
| Lake Sup. Corp | 9 | ..... | Oct. 2 | 40,000,000 | | ..... | ..... |
| New York Air Brake | 105 | —5 | June 18 | 10,000,000 | 8 | 8 Q. | Apr., 1907 |
| Niles-Bement-Pond | 130 | ..... | Feb. 6 | 5,000,000 | 6 | 6 Q. | Mar, 1907 |
| Niles-Bement-Pond pr | 105 | ..... | | 2,000,000 | 6 cum | 2 Q. | May, 1907 |
| Otis Elevator Co | 35 | ..... | March 18 | 6,350,500 | | 3 A. | Apr., 1907 |
| Otis Elevator Co. pr | 87 | —3 | | 6,308,500 | 6 n. c. | 6 Q. | Apr., 1907 |
| Penn. Steel | 90 | ..... | May 13 | 10,750,000 | | ..... | ..... |
| Penn. Steel pr | 100 | —1 | | 16,500,000 | 7 n. c. | 3½ S. A | May, 1907 |
| Pittsburg Coal Co | 11⅞ | + ⅛ | Feb. 11 | 32,000,000 | | ..... | Nov., 1906 |
| Pittsburg Coal pr | 52⅞ | ..... | | 32,000,000 | 7 | ..... | Apr., 1907 |
| Pressed Stl. Car | 31 | ..... | Feb. 20 | 12,500,000 | | 3 | Aug., 1904 |
| Pressed Stl. Car pr | 89 | — ⅞ | | 12,500,000 | 7 n. c. | 1¾ Q. | May, 1907 |
| Pullman | 160⅝ | —4½ | Oct. 17 | 100,000,000 | 8 | 2 Q. | May, 1907 |
| Railway Stl. Spring | 39 | —1 | Mar 7 | 13,500,000 | | 4 S. A. | Mar., 1907 |
| Railway Stl. Spring pr | 91 | —1 | | 13,500,000 | 7 cum | 7 Q. | Mar. 1907 |
| Rep. Iron & Steel | 24¼ | — ⅝ | Oct. 9 | 27,191,000 | | ..... | ..... |
| Rep. Iron & Steel pr | 85 | + ⅛ | | 20,416,800 | 7 cum | 7 Q. | Apr., 1907 |
| Sloss-Sheffield | 55½ | + ¾ | Mar. 5 | 10,000,000 | 5 | 5 Q | Oct., 1906 |
| Sloss-Sheffield pr | 90 | —3 | | 6,700,000 | 7 n. c | 7 Q. | Apr., 1907 |
| Tenn. Coal & Iron | 139 | ..... | May 7 | 22,553,060 | 4 | 4 Q. | May, 1907 |
| U. S. Pipe & Fdy | 31½ | —2 | June 26 | 12,500,000 | 4 | 4 Q. | Dec., 1906 |
| U. S. Pipe & Fdy. pr | 81 | —1 | | 12,500,000 | 7 n. c. | 7 Q. | Dec., 1906 |
| U. S. Steel | 32⅝ | + ⅛ | April 15 | 508,302,500 | 2 n. c. | ½ Q. | Mar., 1907 |
| U. S. Steel pr | 97 | — ⅞ | | 360,281,100 | 7 cum | 7 Q. | Feb., 1907 |
| U. S. Steel 5's | 99⅝ | — ¾ | | 463,798,000 | 5 | 5 A. | ..... |
| Va. Iron, Coal & Coke | 64 | ..... | Sept. 17 | 8,641,600 | | ..... | ..... |
| Westinghouse Elec | 143 | — ¾ | July 24 | 24,998,700* | 10 | 10 Q. | Apr. 1907 |
| West'ghouse Air Brake | 142 | —3 | Oct. 1 | 11,000,000* | | 22½ Q. | Jan., 1907 |

Par value of shares, $100, except those starred, $50.

# NEWS FROM MANY INDUSTRIES.

**New Buyers:—**

The Highland Machine Co., Boston, has been organized with a capitalization of $25,000 by William L. Weber, 253 Harold street, and Geo. W. Austin, 202 Harold street, both of Boston, and Charles P. Lincoln, of Somerville, Mass.

The Lincoln Stove Repair Co., Lincoln, Neb., has been incorporated with a capital of $25,000 by O. J. Allison, T. F. Bartlett, Ernest Hoppe and George G. Waite.

The Globe Special Machinery Co., Chicago, has been chartered to manufacture special machinery with a capital of $30,000. The incorporators are: Michael J. O'Donnell, John Ekstrom and Fred Stone.

Articles of incorporation have been filed by the Mora Iron Co., Duluth, Minn., with a capital of $50,000. The incorporators are: E. H. Mather, William Harrison and S. T. Harrison.

With a capital of $50,000 the Wales Foundry & Mfg. Co., New Brunswick, N. J., has been organized by Charles T. Wales, 93 Sanford street, Henry H. Janeway and A. C. Streitwolf Jr., 59 Livingston street, all of New Brunswick.

The Floor Scraping Machine Co., New York, has been incorporated with a capital of $60,000 to manufacture machinery for scraping and polishing floors. The incorporators are: John B. Hicks, Edwin F. Murdock and William A. Walling, 26 Cortlandt street, New York.

The Industrial Metal Works, Seneca Falls, N. Y., has been organized with a capitalization of $2,000 by Joel F. Troutman, William H. Inglis, Mildred Troutman and Emma G. Inglis, all of the address given above.

The Motor & Mfg. Works Co., Geneva, N. Y., has been chartered to manufacture engines, motors, boats, etc. The capital stock of the company is $40,000, and the incorporators are: David Reid and Thomas H. Chew, of Geneva, N. Y., and Murray Haskins, of Seneca Falls.

The Hardware & Machine Reduction Co., New York, has been organized with a capitalization of $10,000 to manufacture tools, machinery, hardware, etc., by Frank La Gratta, 170 East 102nd street; M. Benincassa, 462 East 115th street, and Luigi Mazzala, 311 112th street, all of New York.

The Automobile Sales Corporation, New York, has been formed to manufacture motors, engines, etc., with a capital of $25,000 by Joseph J. Evans, George W. Condon, Ralph C. P. Evans, 1777 Broadway, New York.

Articles of incorporation have been filed by the Taunton Motor & Machine Co., Taunton, Mass., with a capital of $25,000. Those interested are. Edwin F. Baker and Clarence E. Gilman, both of Taunton.

The Equilibrium Valve Engine Co., Brooklyn, N. Y., has been incorporated with a capital of $10,000 by William L. Murphy, 94 Quincy street; Henry W. Fuller, 249 Seventh street; Edmund A. Andrews, 175 Pulaski street, all of Brooklyn.

Frank Rudd, 40 Orange street, Brooklyn; John N. Blair, 27 North Washington street, New York, and Louis F. Starr, Flatbush, N. Y., have incorporated the Young Machine & Tool Co., New York, with a capital of $25,000. The new concern will manufacture machinery and tools and foundry supplies.

The Gibney Iron & Steel Co., Phillipsburg, Pa., has been chartered with a capital of $50,000 by N. Gibney, C. T. Gibney, Phillipsburg, and J. P. Monahan, Easton, Pa.

Articles of incorporation have been filed by the Beatrice Iron Works, Beatrice, Neb., with a capital of $50,000. The officers of the new company are: A. J. Trude, president; H. M. Hepperlin, vice president; August Schaeffer, secretary and treasurer, and L. H. Miller, superintendent.

The Park Drop Forge Co., Cleveland, has been organized with a capitalization of $100,000 by C. H. Kelly, M. G. McAleenan, J. C. Rexroth, C. G. Eastry and G. C. Ford.

The Manufacturers' Iron Foundry, Bridgeport, Conn., has been incorporated to manufacture high grade gray iron castings with a capital of $10,000 by Frederick Schrader, Carl C. Back and Frank D. Wilder. The business was established at 785 Union avenue about a year ago.

The Automatic Emergency Uncoupler Co., Rockford, Ill., has been organized to manufacture railroad supplies, the chief specialty of which will be an emergency uncoupler designed to automatically cut off the engine from the train and set the brakes in case of accident. The invention is that of E. H. Flannary. The new company is capitalized at $20,000.

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**New Construction:—**

The Ironton Malleable Co., Ironton, O., recently organized, will erect a malleable foundry with a capacity of 25 tons of finished castings a day. Two buildings will be constructed, one 120 x 380 feet, and the other 80 x 270 feet, with brick walls and composition roofing. Both of the wings will be fitted with traveling electric cranes. No contracts have been let as yet for the steel work, and the company is in the market for all bids and estimates that it can get. Equipment common to a malleable foundry will be needed.

The Sylvan Steel Co., Moline, Ill., has awarded the contract for an addition 100 x 150 feet to its plant.

The Hanson & Van Winkle Co., Newark, N. J., has contracted for a new machine shop three stories high 40 x 100 feet.

The Decatur Foundry Co., Decatur, Ind., recently incorporated, is about to begin the construction of four new buildings. The main foundry building will be 60 x 220 feet, and the core, pattern and finishing room will be 36 x 140 feet. The product of the plant will be gray iron castings of light and middle weight, and also castings of brass and aluminum.

The Seattle Frog & Switch Co., Seattle, Wash., manufacturer of frogs, switches and other railroad track material for use on logging and mining railroads, will enlarge its present plant and increase its output.

The Elmwood Castings Co., Station P, Cincinnati, recently organized, will manufacture a general line of gray iron castings largely for use of the parties interested. An initial foundry building of brick and steel construction 125 x 300 feet, divided into two bays of 35 feet each, and a central bay of 50 feet, has been contracted for, with provision made for an addition of equal size. The equipment will include electric traveling and pneumatic hoists, cupolas, core ovens, hydraulic elevators, tumblers, industrial tracks, cars, etc., with molding machines. About six acres of ground in St. Bernard, on the Murray road and Big Four railroad, exceptionally well adapted for manufacturing purposes, has been secured. The officers are: James E. Stacey, of the Stacey Mfg. Co., president; S. W. Spear, formerly connected with Buffalo and Susquehanna foundry interests, vice president and general manager; A. L. Pope, cashier of First National Bank of Elmwood Place, treasurer; Joseph Rawson Jr., secretary.

The Novelty Iron Works, Sterling, Ill., which recently suffered damage

by fire, is rebuilding with a structure 45 x 119 feet. The front half of the building will be two stories high, and the balance, covering the enameling and japanning plant, will be only one story high. It was this part of the plant that suffered most from the fire. Not much equipment, other than that which the company can build itself, is needed.

The Bay State Tap & Die Co., Mansfield, Mass., is building two one-story brick machine shop additions 30 x 62 feet and 30 x 67 feet.

The Lombard Machine Co., Worcester, Mass., is having plans drawn for a new machine shop 70 x 110 feet, which it will erect to its plant.

Ground has been broken for the new blast furnace which the Hamilton Iron & Steel Co. will erect at New River, near Hamilton, O.

The New Process Steel Co., Marshall, Mich., manufacturer of high grade crucible steel for automobile, gas engine and machinery castings, has awarded the contract for an addition 50 x 123 feet to its present plant. The new part will provide space for cleaning and shipping rooms, core room, pattern storage, carpenter room, etc. The present building, 60 x 123 feet, will be used as a foundry exclusively. The company is enjoying a very successful existence. The officers are as follows: President, S. F. Dobbins; vice president, F. A. Stuart; treasurer, F. S. Deuel; secretary and manager, S. C. French. Allen Van Eschen is superintendent of the plant.

The Glens Falls Machine Works, recently organized, will take over the business until recently conducted by the Moore Screen Co., Sandy Hill, N. Y., and Tromblee & Paull, of Carthage, N. Y. The officers of the new company are W. W. Wells, president; A. R. Paull, vice president; A. Tromblee, secretary and treasurer. The company is now building a new factory at Glens Falls for the purpose of manufacturing the Moore screen, the Tromblee & Paull rotary sulphur burner, the Cedar Point grinder, centrifugal turbine pumps and other paper and pulp mill machinery. The tools and the entire equipment of the factory will be of the latest and most improved patterns and will be driven by electricity with individual motors. The building will be one story 76 x 115 feet, with monitor center 26 feet high in the clear and 37 feet wide. The building will be of brick, steel and concrete and fireproof. It is expected that the factory will be in operation by the first of July. The offices of the Moore Screen Co. and Tromblee & Paull have been moved to Glens Falls.

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**General Industrial Notes:—**

The Gadsden Pipe & Fittings Co., Birmingham, Ala., recently organized, has bought the plant and equipment of the Gadsden Pipe & Foundry Co., and will continue operations as in the past.

The Champion Machine & Forging Co., Cleveland, has recently equipped a modern plant for the exclusive manufacture of heading machines and steam hammer forgings. The company has excellent facilities for turning out at its plant such work as upset rods, axles, upset collars, clevises and special forgings of all kinds.

The Blake Pump & Condenser Co., Fitchburg, Mass., recently organized, will manufacture steam pumps and condensers. The company is in the market for small tools, etc., at the present time.

The Leetonia Tool Co., Leetonia, O., recently organized, will manufacture coal miners tools, coal drilling machines, etc. The company is using natural gas for power and gas for heating steel in the furnaces.

The Sharples Separator Co., West Chester, Pa., states that the fire which visited its plant caused only a slight loss to the cupola house.

The Hart Foundry Co., Peoria, Ill., just incorporated, is the outgrowth of the foundry department of the Hart Grain Weigher Co. The company has been operating a foundry in connection with its manufacturing business for the past several years. Recently it has taken on considerable outside tonnage, and has decided to keep the foundry business separate from its other line. A number of foundry employes have been taken into the new organization as stockholders. The company is prepared to make during the coming year 2,500 to 3,000 tons of outside castings, its line being light gray iron work, ranging in character from implement parts to automobile cylinders.

The Shelbyville Foundry & Machine Works, Shelbyville, Ind., recently organized, will manufacure small gas and gasoline engines. The company does not contemplate any building before next year.

The Littlefield Stove Co., Albany, N. Y., which lost its foundry and storehouses through recent fire, wishes to contract for a large quantity of castings.

At the annual meeting of the South Baltimore Steel Car & Foundry Co., Baltimore, held recently, the retiring board of directors was reelected. At a subsequent meeting the present officers were also reelected.

The Shelby Machine & Supply Co., Shelby, N. C., has elected John F. Schenck, Lawndale, N. C., president; Thomas B. Richards, Shelby, vice president, and William T. Carlton, Lattimore, N. C., secretary-treasurer.

The plant of the Summit Foundry Co., La Crosse, Wis., has passed into the hands of a company of local capitalists, including L. C. Colman, H. L. Colman, E. L. Colman, F. P. Hixon, and J. M. Hixon. The company is capitalized at $95,000.

The plant of the Hiett Plow Co., Dryden, Ark., will shortly be moved to Bono, Ark., where J. N. Hiett has already opened the business. Mr. Hiett has recently invented an improved plow which he will manufacture at Bono.

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**Trade Notes:—**

The experimental department of the Pittsburg Automatic Vise & Tool Co., Pittsburg, is now working upon a vise which is stated will greatly improve the bench practice now in vogue in the largest machine shops.

The Philadelphia Gear Works, Inc., Philadelphia, announces that some time during the summer it will remove from its present address to its own building, the exact location of which has not yet been definitely determined.

The Fox Machine Co., Grand Rapids, Mich., within the past month has installed two new Jones & Lamson flat turret lathes, a tool room lathe and some other minor equipment. By means of increasing the equipment and the working force, deliveries are being shortened materially on Fox light millers, universal wood trimmers and other Fox tools.

The Scottdale plant of the U. S. Cast Iron Pipe & Foundry Co. has recently added four No. 84 Newton patent cupolas to the melting equipment of its pipe foundry. The plant now has six cupolas of this make. Each cupola has a stack of approximately 57 feet high, and an average capacity of about 16 tons per hour, giving approximately 96 tons hourly capacity. These cupolas were made and furnished by the Northern Engineering Works, Detroit, Mich., builders of foundry machinery.

The Southwestern Bridge Co., Joplin, Mo., has been awarded the contract for all the bridges on interurban lines between Sherman and Dallas, Tex. The work consists of concrete substructures with steel superstruc-

tures of plate girder spans, riveted truss spans, steel trestles and beam bridges. The Texas Co. of Dallas, Tex., has also awarded the contract for two additional pump houses to the Southwestern Co.

**Fires:—**

The foundry and machine shops of the Eagle Foundry Co., Fort Scott, Kan., were visited by a disastrous fire May 20, causing a loss of about $35,000.

The cooper shop of the Braddock, Pa., plant of the American Steel & Wire Co. was damaged about $40,000 by fire May 28. Valuable machinery and finished stock were included in the damage.

## AMONG PENNSYLVANIA INDUSTRIES.

Harrisburg, Pa., June 5.—Aside from the starting of the first of the 75-ton open-hearth furnaces at the Steelton plant of the Pennsylvania Steel Co., and the sale of the properties of the Susquehanna Iron & Steel Co. at receiver's sale, there has been little doing in this section the last few weeks. Large orders are being placed for rails and plates, it is reported at offices and careful survey is being made of the situation because of the pig iron prospects for next spring. Practically every available furnace in this part of the state is working and those on repairs are being rushed. The production is mounting every week and some old fashioned stacks are doing themselves proud.

The furnace started in the Steelton mill is the first of five and the others will be put in from time to time.

The price paid for the two furnaces, four rolling mills and pipe mill of the Susquehanna company by a representative of the firm of John Leonard & Co., of New York, was $110,000 over a mortgage of $300,000 and $150,000 for personal property. The company had a capital of $1,500,000, and there is a considerable floating indebtedness. The new owners propose to operate the mills.

The contract for the structural steel work on the five shops additional to the main shop building for the Hocking Valley railroad at Logan, O., has been awarded to the Mt. Vernon Bridge Co., Columbus, O. The same company has secured the contract for the main building. The contract includes the construction of a carpenter shop, 60 x 120 feet; power house, 60 x 120 ft; office and store rooms, 25 x 50 feet; pipe and tin shops, 30 x 50 feet, and lumber dryers, 40 x 50 feet. All the buildings will be of structural steel frame filled with brick.

## BROKEN RAILS

### Being Investigated by Government Commission.—Canadian News.

(Special Correspondence.)

Toronto, Canada, June 2.—The Canadian Railway Commission is investigating the problem of the prevention of railroad wrecks caused by broken rails, which have become increasingly numerous of late. Since Nov. 15, there have been six wrecks in Canada resulting in loss of life directly due to this cause, as well as many minor accidents. G. A. Mountain, chief engineer of the commission, has asked the railroad companies to submit their specifications for rails now ordered. The Canadian Pacific railway has already done so. This company has also detailed an inspector to watch the process of rolling and see that the specifications are duly observed. One question now being considered by the commission is the advisability of having a government inspection of rails, either while they are in process of manufacture or before the companies are allowed to lay them. Engineer Mountain and the engineers of the leading companies are now investigating the whole problem of rail-making.

Reports from English financial papers state that the J. I. Case Mfg. Co., of Racine, has issued bonds for £5,000,000 for the purpose of building factories in Fort William, Ont., and St. Petersburg, Russia. This seems to be borne out by the fact that the company owns a site of 192 acres in Fort William, with a frontage on the Kaministiquia river, which is admirably adapted for factory purposes, being touched by three transcontinental railway lines.

An important discovery of hematite iron ore has been made within a few miles of Roblin. Messrs. M. J. Galvin of Toronto, and Anthony Wagner have staked claims in Boggy Creek valley, where the ore deposit on analysis shows 61 per cent hematite. Development will at once be proceeded with.

## NEW ENGLAND INDUSTRIES.

(Special Correspondence.)

Worchester, Mass, June 4.—The McCloud, Crane & Minter Co., maker of machine screws, has changed its name to that of the Anthony Screw Co. The reason for this change is that none of the original members is now connected with the business. The Anthony Screw Co. has E. M. Anthony, president; A. H. Anthony, secretary and treasurer.

The following buildings are being erected: A four-story reinforced concrete machine shop for the Simplex Electric Co., Cambridge, Mass., 110 x 100; estimated cost $40,000; a five-story frame factory addition for Winslow Skate Mfg. Co., Worcester, 26 x 46; and a one-story brick addition to the foundry of A. Carpenter & Sons Foundry Co., Providence, 80 x 110.

The machinery and fixtures of the Omega Steel Co., Ansonia, Conn., were sold at auction May 21, and brought in the neighborhood of $2,500. The liabilities are about $1,900, and creditors will receive 100 cents on the dollar. The secret process of making steel was not sold, although a bid was received on it.

## FOREIGN TRADE OPPORTUNITIES.

**(These inquiries from prospective foreign purchasers are furnished by American consuls to the Government Bureau of Manufactures, Department of Commerce and Labor. Those in which the addresses are omitted are on file at the Bureau of Manufactures, Washington, D. C. In applying for addresses refer to the file number.)**

No. 1014. Railway equipment.—The Danish department of public works of Copenhagen proposes to purchase three locomotives for express trains, and 12 passenger carriages, at a cost of 609,000 kronen ($163,000).

No. 1015. Candle-making machinery.—A candle manufacturer of Scandinavia writes to the bureau of manufactures that he desires to purchase a new American machine which gives to the candles a better and finer polish than heretofore obtained.

No. 1019. Railway construction.—A Reuter telegram from St. Petersburg says: The council of ministers has decided to double the track of the Siberian Railway. A second track will be laid between Atschinsk and Irkutsk during the present year.

No. 1021. Rolling stock of Argentine Railways.—Consul-General Snyder also sends the following information from Buenos Ayres: The Argentine minister of public works has just published a decree in which he sets forth the tonnage of freight cars which each railroad in the republic will be required to have by the end of the present year. The requirements, in tons, are as follows: Great Southern, 217,000; Buenos Ayres Western, 127,000; Rosario, 102,000; Central Argentine, 136,000; Pacific, 116,000; Great Western, 41,000; Andine, 14,000; Santa Fe Provincial, 53,700; Central Cordoba, 36,000; and Cordoba and Rosario, 10,800. I have not been able to ascertain what additions the various roads will have to make to meet this decree.

No. 1035. Elevators and Whitewashing machines.—An importing agent in Italy writes to the bureau of manufactures that he is interested in a firm which has taken the contract to build many new houses, every one of which is to have a lift. He desires to know if there is not an American house making these lifts which could offer them at favorable prices and terms.

No. 1038. Steel hulls for motor boats.—Gosta Smitt, civil engineer, Hernosand, Sweden, writes. A year or so ago there were sold hulls for motor boats, pressed in two halves cut of steel, in Gotoberg, Sweden. As there is now a demand here for motor boats of that kind, I would be glad if you give me names and addresses of the manufacturers in America.

No. 1052. Harbor improvements.—Consul Milo A. Jewitt, of Trebizond, Turkey, writes as follows: The municipal council of the city of Trebizond, under the new presidency of Djamal Bey, has decided to build at this port an iron pier to facilitate loading and unloading merchandise. The pier is to be 10 meters wide and 60 meters long. Detail of construction and purchase of materials are not yet decided on, but any construction party interested may address the American Consul at Trebizond, who will be pleased to furnish further information as it is obtainable.

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